IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF MICHIGAN
SOUTHERN DIVISION

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UNITED STATES OF AMERICA,

Plaintiff,

v. CASE NO: 1:20-CR-24

MUSTAFA DEVILLE REYNOLDS,

Defendant.

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DAUBERT HEARING and FINAL PRETRIAL CONFERENCE

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BEFORE: THE HONORABLE PAUL L. MALONEY
United States District Judge
Kalamazoo, Michigan
July 23, 2021

APPEARANCES:

APPEARING ON BEHALF OF THE PLAINTIFF:

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APPEARING ON BEHALF OF THE DEFENDANT:

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I N D E X

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E X H I B I T S

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E X H I B I T S (continued)

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Kalamazoo, Michigan

July 23, 2021

at approximately 9:49 a.m.

PROCEEDINGS

09:49:38 THE COURT: This is File Number 20-24; The United States of America vs. Mustafa Reynolds. This matter is before the Court on two defendant motions, ECF 89, to exclude cell site analysis testimony by the government, and 95 is a motion to exclude cell site analysis completely, 09:50:02 that's ECF 95.

The record should reflect that Assistant United States Attorneys Alexis Sanford and Dan McGraw are here on behalf of the government. Attorneys Tilton, Fisher, and Celis are here on behalf of the defendant.

09:50:20 The Court is ready to proceed. How would you like

to proceed?

MS. SANFORD: Your Honor, if it's okay with the Court, the government would start with witness testimony and then argue these motions.

09:50:30 THE COURT: All right. That's fine.

MR. TILTON: Your Honor, with regards to the Daubert hearing, our Rule 16 motion asks for a couple different possible remedies, one of those remedies was exclusion, one was granting a continuance. Based upon the

09:50:51 party's response to our Rule 16 motion yesterday, I believe the parties are in agreement to the size of the data that was produced last week, the approximately 50,000 data points within the Google maps, and I didn't see an objection to, as far as the time line we mapped out, as far as when those

09:51:13 were created, and when they were in the government's possession. We would object to proceedings on the Daubert hearing today.

THE COURT: Why?

MR. TILTON: For a couple reasons; one, I would go

09:51:24 back to the case that we had cited, Sixth Circuit case, United States vs. Davis, it's 514 F.3d 596. We are -- The Sixth Circuit found that there was a Rule 16 violation when the government did not hand over notes belonging to a chemist when that chemist was going to testify as an expert

09:51:47 at trial. And what the court was really concerned with

there was that the defense wasn't able to analyze the steps that the expert took prior to testifying. What we have here, as far as the Daubert hearing goes, is the proposed expert here, we can't analyze his steps and haven't been able to digest the 50,000 data points in a week. And that is why we are requesting additional time.

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I would additionally point to the government's response to our Daubert motion, that says that Mr. Ray is going to opine about the exhibits created by Detective Heikkila and how he confirmed their reliability. Well, without access to those data points until last week, we haven't had an adequate opportunity to present it to our expert to look at all of the different data points within those KMZ files and had an opportunity to review those inform their own opinion.

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Additionally, I would just note as an additional source for the court to consider is the Department of Justice's own policy related to discovery trials and other proceedings, and it's Section 95001, when it talks about the duty to disclose in cases with forensic evidence and experts. Point 3 says, "If requested by the defense, the prosecutor should provide the defense with a copy of or access to the laboratory forensics expert's 'case file,' either in electronic or hard copy form." And goes on to say later that it should include the underlying documentation of

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the examination/analysis performed and contain the material necessary for another examiner to understand the expert's report. And that's really the crux of why we have asked for some sort of remedy here, is we now have all of these points. I understand the government's argument that some may not be related or relevant to the time period of August 20th when the offense is alleged to have occurred, but there are a number of different data points just from August 20th. We are talking about four different cell phones, a Google gmail account, which is constantly connecting to wifi, the cell phones have voice connections, so every time a call is made, every time a text is made, every time they access data, Mr. Ray's TRAX software maps that information, and so even just if it were limited to August 20th, it's a significant amount of information, and looking at how that information plays together, I think, is very important for determining the reliability of these exhibits that the government intends to introduce.

Additionally, and Mr. Ray can, I guess, testify if the Court wants today, but in other testimony, he's talked about the need to get at least 30 days of records, and even when I mentioned in our motion that I participated in a TRAX webinar, they discussed getting at least 45 days worth of records. So there is a lot to examine here, even if the relevant time period is shrunk down from the 90 days of

records that Detective Heikkila obtained through search warrants back in September of 2019.

So we are requesting additional time.

THE COURT: So you don't want to do anything today?

09:55:43 MR. TILTON: We are requesting additional time to hire an expert to look at these TRAX specific --

THE COURT: That's not responsive, Mr. Tilton. You don't want to do anything today?

MR. TILTON: Until we have an opportunity to review

09:55:55 those records, I don't believe that we are in a position where we can move forward with the Daubert hearing.

THE COURT: Miss Sanford, go ahead.

MS. SANFORD: Thank you, your Honor.

Contrary to Mr. Tilton's representations, they have

09:56:11 had this data all along. They have had calls --

THE COURT: Is that true, Mr. Tilton?

MR. TILTON: We have had cell tower records since initial discovery or early on in the discovery process. We have not had the data as Detective Heikkila after when he

09:56:29 uploaded it to this TRAX software and the TRAX software mapped it, we have not had any of that with the exception of the, you know, the ten or so maps they provided in April or early May, but --

THE COURT: You had the raw data that forms the

09:56:43 basis for the detective's opinion, if I read the

government's answer correctly. Is that accurate?

MR. TILTON: So we have had one part of the equation. What the TRAX software does is it takes that raw data, it interprets it through its proprietary list of cell tower information, and then it creates these different maps, which are horizontal planes, which are arcs, which are specific locations as to where a telephone or other device might be. So we have not had -- We have had one part of the equation, but we haven't had --

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THE COURT: What part of the equation haven't you had?

MR. TILTON: We haven't had the part that TRAX uses, so we haven't had -- I mean their own mathematical equations are proprietary, their cell-site list is proprietary, we have not had that. And as the, I think Davis case, in Sixth Circuit highlights, is we haven't been able to follow the steps that they took to get to their conclusions, and now that we have those KMZ files, now that we have all of these different data points, we are able to look at it and we are able to determine if it's reliable.

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MS. SANFORD: They have had all of the information that would be required to generate maps of where these cell towers were, because that is included in the call detail records; what tower somebody connected to, what sector of the tower, what the angle of that sector is, and the

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latitude and longitude of the tower. And there are a lot of software programs that can map this information. TRAX is one visualization program. But we have provided them the data that we used -- that our expert used to form his
09:58:42 conclusions, and I think that that is all that we are required to provide.

An analogy might be some sort of computer crimes case. We might provide defense or defense expert with a copy of a hard drive so they could do their own forensic
09:58:57 examination. But we aren't required to provide the software that they would need to do that. They had all of the data they need to map this. They could have mapped anything. They could have mapped the information that we are going to use at trial to test that particular reliability. As far as
09:59:10 whether there was -- they should have 30 or 45 days worth of data to be reliable, we know that is the case here. They have 90 days worth of data.

THE COURT: How much?

MS. SANFORD: Ninety, from June through August of
09:59:21 2019, is what Detective Heikkila requested from providers. So he has enough data for it to be a reliable set pursuant to ZetX's requirements, but I don't think it's necessary that they have all of the maps. We provided them, to be courteous, when Mr. Tilton requested, I asked if they could
09:59:37 burned to a disk, Detective Heikkila said yes, and so we

did. But they have the actual data to do any mapping or have any expert review any of this information that would be required.

We don't think a further delay is necessary. We have been fighting about this cell-site location information throughout this trial, it keeps getting postponed for purposes of hearings, and the government is ready to proceed and would like to do so.

MR. TILTON: Your Honor --

THE COURT: Do you have 90 days worth of data?

MR. TILTON: In which form? So I guess I just want --

THE COURT: In any form.

MR. TILTON: So now we have 90 days worth of data in two forms. We have 90 days worth of data in original cell tower information provided.

THE COURT: That's government generated?

MR. TILTON: That is generated directly by the -- they gave it to us from the providers.

THE COURT: Okay.

MR. TILTON: So then last week we have the 90 days worth of data that's provided through the TRAX software, and you know --

THE COURT: Did you have 90 days worth of data that you could have done anything you wanted with?

MR. TILTON: Well, I think that --

THE COURT: Yes or no? I mean the government's position is, look, we gave you 90 days worth of data. You had every opportunity to do whatever you wanted with that data, put it through software numbers A -- letters A, B, C, D, and E, and that's all they are required to give you. If you -- Did you have that capability?

MR. TILTON: Well, we didn't know that the TRAX program existed, and but I don't think that is the right question, because it's their expert and their expert is -- they are trying to introduce this expert testimony and testing that has been done. And again, what the Davis case says is they have to show us the steps. And that's what we need to be able to confirm. And that's what we are asking for. It's no different than in any drug case where we get a lab report and we request the bench notes. That's what we are trying to do. We are trying to determine reliability. We are trying to determine if the way that they produced their expert's report and the maps are reliable.

And another thing that I believe Mr. Ray will say today is, it's his practice to always provide this information to defense the whole file, like the Department of Justice's own policy says, and that's what we want to be able to understand how Detective Heikkila came to his conclusions. What they provided was a screen shot of one

little part of that, and a screen shot that then had data added to it. So we have to be able to get all of the data to look at it, to validate their steps, and that's their obligation where it's their expert to provide it to us. And we asked for it, and we asked for it multiple times. And we weren't told that these other KMZ files are out there, but we are just not entitled to them. We repeatedly asked, and the government said we had all of the data, and that's just not true, and it's not what is required for them to produce.

10:03:20 THE COURT: Go ahead, Ms. Sanford.

MS. SANFORD: I mean I don't want to keep beating a dead horse. They did have the data. They had the ability to map it --

THE COURT: This horse has been flopping around now 10:03:31 for quite awhile.

Go ahead.

MS. SANFORD: They had the data. There are numerous programs that can map data. There are numerous experts that could help them interpret the data. It's my 10:03:42 understanding they have retained some experts. I don't know what they used those experts for, but I don't think that the government has been hiding the ball at all on this. They have had all of the call detail records, all of the service provider records since February of 2020.

10:03:53 Now, the government didn't think that all of these

maps were relevant, and so we produced an exhibit that we are going to use at trial that is relevant, and when asked, we did produce the rest of the maps for Mr. Tilton last week, but I don't think that there is anything that they were entitled to that they were denied. And I don't think there is any reason to delay the hearing today.

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THE COURT: Well, I don't think there is any reason to delay the hearing either, at least for purposes of taking the initial testimony of the government's witnesses.

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Mr. Tilton, after we have concluded the hearing today, if you believe you need more, we will deal with it at that particular point in time, but we are going to go ahead with the hearing, and you can make your record in terms of what you need after we have completed that hearing -- or this hearing, and we will take it from there.

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I really don't want to adjourn this case. This case has been set multiple times, and I'm having a little bit of difficulty understanding the issues that are of concern to the defendant, but perhaps they can flesh it out for me a little later.

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So call your witness, Miss Sanford.

MS. SANFORD: Thank you, your Honor.

The government calls Sy Ray.

THE COURT: And Mr. Ray is testifying via ZOOM; is that right?

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MS. SANFORD: Yes, your Honor.
THE COURT: Is that agreeable, Mr. Tilton?
MR. TILTON: That's fine, your Honor.
THE COURT: You've consulted with your client --
10:05:23 THE DEFENDANT: I agree.
THE COURT: -- on this subject?
MR. TILTON: Yes.
THE COURT: That's okay with you --
THE DEFENDANT: Yes.
10:05:28 THE COURT: -- Mr. Reynolds?
THE DEFENDANT: Yes.
THE COURT: Thank you, sir.
Would you raise your right hand, sir.

SY RAY,

was thereupon called as a witness herein, and after having been first duly sworn to tell the truth, the whole truth and nothing but the truth, was examined and testified as follows:

THE COURT: Thank you, sir.
10:05:46 Ms. Sanford, you may proceed.
MS. SANFORD: Thank you.

DIRECT EXAMINATION

BY MS. SANFORD:
Q. Mr. Ray, what is your title and where do you work?
10:05:51 A. My title now is I'm actually a director over

geolocation devices for LexisNexis. Our company, ZetX, was recently purchased by LexisNexis. So I was previously the founder and owner of ZetX, but as of May we became a LexisNexis company.

10:06:12 Q. And you have previously provided a copy of your curriculum vitae; is that correct?

A. I have.

Q. And that was marked as Government Exhibit 40?

A. I believe so, correct.

10:06:23 MS. SANFORD: Your Honor, at this time, the government moves to admit Government Exhibit 40?

THE COURT: Any objection?

MR. TILTON: No objection.

THE COURT: Received.

10:06:27 BY MS. SANFORD:

Q. Can you just briefly tell the Court a little bit about your background and work in law enforcement.

A. Sure. So, I began my law enforcement career in Arizona in 1995. Spent, you know, just like any other police

10:06:43 officer, some time on the road as a patrol officer, moved into an investigations position, spent the overwhelming majority of my career in investigations roles. Ultimately promoted to a sergeant, which I ran our homicide unit for a number of years, and then retired in 2014.

10:07:02 Q. On Page 4 of your C.V., you list fields of expertise,

particularly cell phone and radio frequency devices?
A. Correct.
Q. How did you acquire expertise in those areas?
A. So in the late '90s, I began working investigations
10:07:22 that involved cell phone records, and at that time, training
for law enforcement in this field was very sparse. So my
initial training actually came directly from the providers.
An example of that would be, I was working on an AT&T case,
I would contact the engineers within AT&T to help explain
10:07:39 and help me understand what the records meant. Over the
years, I was able to start finding other training that was
provided to law enforcement in reference to these records,
but my career just kind of aligned with cell phone
technology, and I found myself commonly being in a position
10:07:54 where there just wasn't training and I ended up having to be
self taught on a lot of this stuff.
In mid 2000s, our agency was working what is called
cell-site simulator. What this device is, is it's a way to
go out into the field and physically identify where a phone
10:08:12 is located, such as it's inside of a house, or it's in a
particular room inside of a house. As part of that
discipline, I had to receive extensive training on cellular
networks, how cell phones connect to the cellular networks,
how we can actually create a fake cell-site, that cell-site
10:08:32 would then attract a particular target cell phone, it would

cause that cell phone to register to our cell site, and that would give us the ability to physically locate that phone.

Over the course of my career, I've probably done over 2000 of those types of missions where we have physically gone out into the field to physically locate where a device is at. As result of that, there is a period to analyze records and look at how cell phones are working on a day-to-day basis. It looks like a pattern analysis. Over the years, I've probably looked at thousands and thousands of cell phone records, specifically as they relate to criminal investigations.

In 2010, I was actually recruited by the Department of Defense to fill a role in Afghanistan doing very similar type work. I came back in late 2010 and finished out my career. That last four years of my career was specifically spent in fugitive apprehension, where the entire time my role was to analyze a set of phone records typically being 45 to 90 days worth of records, come up with a theory essentially of where this device is at and where we could locate it, and then physically go out into the field and find that device. So just an incredible amount of time spent analyzing phone locations specifically.

During that last four years of my career is when I began to build what is called the TRAX system today, so it was actually developed while I was still a police officer.

And it's a unique development process there, because I would actually use the technology, if you will, that created the TRAX program to analyze a set of records, figure out where a device is at, and then physically go out in the field and locate that device. So there was kind of some quality assurance in that.

In 2014, when I retired, I basically hired some very competent programmers, much smarter than myself, to build out this program. So I initially built the TRAX program that ran locally on my laptop, and then when I retired, I hired some programmers to actually scale it out, and that's when we began ZetX.

Q. And you now provide training on TRAX; is that correct?

A. I do. I've been teaching law enforcement, prosecutors, defense attorneys, judges, civilian practitioners for the better part of 15 years now. We have classes all over the country on how to not only use TRAX, but how use cell phone records in general for pattern analysis and geolocation analysis.

Q. Have you testified in court as an expert in the past?

A. Multiple times, in both federal and state courts.

Q. Has that been as to how TRAX functions?

A. Both as how TRAX functions, where the data comes from that TRAX uses, the reliability of the data that TRAX uses, and just some of the anomalies and unique record sets from

the different phone companies, as well as companies like Google, that will provide other types of geolocation data.

Q. So what is TRAX in laymen's terms?

A. TRAX is a visualization program that takes raw data that comes from cell phone providers or some type of data provider. So we will use the example of Verizon. Law enforcement obtains a search warrant to obtain 90 days worth of cell phone records from Verizon.

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The records that come from Verizon, there is going to be multiple, it's not clear-cut just one set of records that you look at, and it's very easy to interpret. Typically there will be maybe up to a dozen different types of data sets that Verizon provides. All of these are going to come in some type of like an excel or text, CSV type format, and they can be very complex to look at. If you just open it up, it's basically just going to look like a bunch numbers to most people.

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What TRAX does is it allows our end users to actually take that raw record that they get from Verizon, they can just drag and drop it into our system, and our system interprets it. What I mean by interpret it, is it scans it, it recognizes that it's a known record set. I'll come back to that in just a second. And once that recognizes the record set, it will go through a processing where it actually will plot where the cell site is located,

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the site of the cell site, the sector that was used, the azimuth, which is the direction that the antenna is positioned, and then it will also provide a basic estimated ranges. This estimated range is to give investigators an idea of how big of a coverage area that particular cell site covers.

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The reason we do the range is that in 2020, 2021, some cell cites in the United States have the capability of covering up to 60 miles. Some cell sites have capability of only covering maybe only 300 meters. So it's important to understand that we can't just take a latitude and longitude of a cell site and throw it on a map and say well, it connected to this cell sight. There is a lot of gray area of what that connection could potentially look like.

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When I refer to record types, where our system will recognize it as a record, we are currently seeing about 1.5 to 2 million calls a week through our system. We have mapped well over 600 million cell calls throughout the United States. So when I say that we have these known record types, we have over 800 different types of record formats that we have seen from around the country. We have researched these formats in depth. We understand what they look like, and our system immediately recognizes, okay, this is a T-Mobile mediations report, type one, or this is a Verizon CDR report, type two. So we are very very familiar

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with the different formats throughout the United States.

And I should probably add on the last part of that. Our system actually will reject and decline to process any format that we haven't seen or if we detect that there's been a change in the format. We have actually set up a little bit of a chain of custody, if you will, that if somebody was to receive a set of Verizon records from the carrier, attempt to modify those records, and then put those records through our system, most likely our system would catch that those modifications have occurred, and it would fail the record processing.

Q. So you say that TRAX is a visualization tool for these records. But in theory -- well, practically, with the records themselves, is it possible to map the cell tower and the azimuth to which a device was connecting?

A. It is. Somebody who actually looks at the records and understands how they are formatted, depending on the provider, would absolutely have the ability to take the records and create hand mapping, if you will. The challenge will come up that, you know, if I have 10,000 phone calls, can I physically hand map 10,000 phone calls, and then more importantly is, what is my error rate, and what is my error rate compared to potentially your error rate. So where somebody could absolutely have the possibility of doing that, we recommend hey, you should probably use a software

that processes it. Which, for the record, we should probably make it very clear that anytime our system is used in a criminal matter, just like this matter, we make our system available to all parties. So in the event that the 10:16:20 law enforcement agency themselves has access to our program, ran these records and actually created the maps, in the event that a trial was to occur based on that mapping, on a regular basis, we make our program available to both the prosecutor's office and the defense on that case free of 10:16:37 charge so that they can actually see how that the program works and exactly how the system creates this visualization.

Q. In this particular case, you spoke to defense counsel, Sean Tilton; is that right?

A. I did.

10:16:52 Q. And did you provide him access to TRAX?

A. We have.

Q. And you said that part of how TRAX visualizes these records is through a cell tower database?

A. That is correct.

10:17:09 Q. And it uses that database to estimate a hand-off area, is that what it's called?

A. That's a perfect analogy. And essentially where that cell tower database comes from is, when I was explaining that, you know, I went and I got records from Verizon 10:17:28 through a search warrant process, part of those records are

going to include a cell site list and that's where Verizon is going to provide a list of all of the cell sites in a particular area in the configuration, how they are actually positioned the angles, all of that stuff. When the records 10:17:46 are uploaded to our system, so are the cell site lists. We have archived all of the cell site lists for all of the providers in the United States going back all the way to 2010, and we have created this database that actually, if you give us a cell site for any carrier in the United 10:18:02 States, we can show you where that cell site is positioned, how it's angled, the configurations, all of that information with it. We have got approximately 25 million cell site sectors in the United States that are within this database.

Q. And how do you use that database to calculate the 10:18:20 hand-off ranges for cell site coverage?

A. So there is a forensic analysis tool for networks called a drive test or drive test equipment. We use a TSME and that is a very small device that's crated by a company called Rhode and Schwarz the reason we use Rhode and Schwarz 10:18:44 products for this, is it's what is already accepted in the industry. When AT&T goes out and does a drive test, or Verizon, they use the same tool from Rhode and Swartz as we use. What this tool allows us to do, is we can go out into the field, and we can draw basically grid patterns through 10:19:02 any area of the country, and this tool is collecting all of

the radiating energy off of cell sites. So it allows us physically to map what a cell site pattern looks like. We can go out and say, you know, if I'm at this particular house, this is the primary cell site serving this house for Verizon. Here is what AT&T's would look like. And if we drive a hundred yards down the road, we tell you if that changes.

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Throughout the course of owning ZetX, we have approximately eight of these drive test scanners out in the field that are constantly collecting information and being loaded into our database. We use the results of those network surveys to basically power our algorithm being able to estimate what a hand-off range looks like.

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When I say a hand-off range, what I'm referring to is how far do I have to go away from a particular cell site before other cell sites will take over and my phone will now connect to a different cell site. So we give these estimated hand-off ranges, and again, as I was saying earlier, it's to let all triers of fact understand, is this a cell site that covers 60 miles, is this a cell site that because of the environment only covers 30 miles, or is this a cell site in a very dense, urban area that maybe only covers 300 meters.

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Our accuracy is about 95 percent. We test this on a regular basis throughout the country. We definitely have

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a known algorithm that we can replicate, that we can put out into the public, it's not something that we don't disclose, and it can be tested when -- and it has been tested, and we actually have been peer reviewed on this by a PH.D. in cybersecurity.

Q. Let me back up and talk to you about that algorithm.

Just in sort of general laymen's terms, can you describe what the algorithm looks at in order to estimate the hand-off range?

A. Sure. So what we have found in all of these drive tests -- I should probably put some quantification behind these numbers. When I say we have been out in the field and commit -- actually conducted drive tests, we have over 2.5 million cell sites that we have forensically analyzed as what the patterns look like, what the coverage areas look like. These range from very dense, urban areas like Manhattan to extreme rural areas like northern Montana. So we have kind of got every spectrum in the different country -- or throughout the country in our database. And what we have done in looking and analyzing the results, we have found if we focus on tower density, and what I mean by tower density is the number of cell sites in an particular area in a specific shape, and what that shape is, is essentially it's a cone extending from the cell site along the azimuth line at about a 60 degree angle, and we extend that cone for

approximately 60 miles. And then our system will automatically calculate how many other cell sites fall within that cone, the distance from each cell site to the target cell site or the cell site that we are mapping, and we have come up with an algorithm where if we start to average what that density looks like, we can accurately predict where these hand-offs will occur. And like I said, we have about a 95 percent accuracy rating. And how we come to the accuracy rating is every time a drive test is done, it's loaded into our system, we look at the results, and we compare it against our current estimations, and we can tell, hey, we are right on the money, or hey, we are a little bit big, we are a little bit small, and over time we found that we can accurately stay at 95 percent. I don't think we will ever get better than 95 percent because we are dealing with radio frequency, and there's always going to be some exceptions to the rule when it comes to radio frequency. Anybody who ever comes into court and claims that they are doing anything with radio frequencies that's a hundred percent, is problematic, that's flawed testimony from the beginning. So 95 percent is our target, and we have been able to maintain that.

Q. You talked about doing drive testing in different types of density, urban areas versus rural areas. Are you also testing various topographies?

A. We do. We get into the deep south where, you know, we don't have a lot of elevation change, but very dense wooded areas. We do a lot of work in the southwest where we are into wide open deserts. We do a lot of work up north where we will see big mountains. Colorado, we do a lot of work actually with fish and game, with wildlife investigators for like poaching cases, and you can imagine some of the different type of record sets that they would see in an area like Colorado.

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So yes, we have mapped records throughout the entire United States. We have drive tests from I think 42 different states at this point.

Q. And you said that drive test data can be loaded in to compare against what the algorithm has estimated and test the accuracy?

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A. That is correct. And that's actually an automated process that we have developed over the last year. We made some significant changes to our accuracy back in April of 2020, and any of the mapping that has been produced since

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that point is where this 95 percent accuracy comes in. Prior to that, our accuracy rate was down in the high 80s. We just couldn't quite get to that 90 percent threshold, and we were able to make some dramatic changes in April of 2020 as a result of all of these drive tests that we had over the

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years and through a bunch of different studies that we have

conducted.
Q. What was in it April, 2020, that you changed?
A. Prior to April of 2020, we were trying to estimate a -- the general coverage area of a cell site. And what I mean by that is, let's assume there is three sectors on a cell site, one pointing north, one pointing down to the southeast, and maybe one pointing over to the southwest. We would look at that as one general site and try to estimate generally what does this cell site look like for coverage? What we found is that our accuracy will never be very high with that, because I could have one sector facing north that faces right into a downtown area and there's 15 other cell sites within two miles of that cell site to the north, but to the south maybe it's on the edge of town and it opens up into these wide open fields and the next closest cell site is 15 miles away. And over time what we have found is that we can't look at a cell site as an individual piece we have to look at each antenna on that cell site. And the technology breakthrough that we had in April of 2020 is our ability to look at sectors individually, not just the cell site. And as soon as we did this we were immediately happy with the results because we are able to accurately see what each sector looks like now opposed to just a general estimation of the cell site itself.
Q. I want to make sure I'm tracking what you just said.

So before you were analyzing coverage for the entire tower, 360 degrees around it, and now you're taking each particular 120 degree chunk; is that correct?

A. Correct, or smaller depending on the technology. And what drove this -- and it's probably worth just explaining a little bit -- is we are seeing a huge change in cellular technology. The big towers that we are used to from the olden days are starting to go away, and what the cell phone companies are doing is they are getting closer to the ground, they are deploying smaller, less powerful antenna, but a lot more of them. And we found there has to be a change in the way that we map these records because the technology is changing. If we are mapping cell phone records the same way in 2021 that we did in 2010, there is --

(ZOOM call interference.)

A. I'm not sure, can you still hear me?

Q. Yes.

A. Okay. So we found that we had to make this change to stay current with what we were seeing with the different technologies, and that's where we had to get away from looking at cell sites as an individual transmission unit, if you will, to the actual antennas whether it's three or four antennas on a particular cell site, one antenna that's mounted on the side of a telephone pole, or a very small

antenna that's located inside of an airport, or a shopping mall, and that's what actually forced some of these changes in our mapping systems.

Q. So we've talked about drive testing as a way to check the accuracy of your algorithm. Have you also use the RTT data to do that?

A. We have, and we probably a better term for that is TDOA, timing difference of arrival. And what TDOA data is, is this is the cell phone's ability -- or cell phone company's ability to actually give us a distance from cell site. So for example, older technologies would say the phone is connected to Cell Site Number 6, and it's on Sector 1. And that's really all we had is that we knew the cell phone was connected to Sector 1 in Cell Site 1. TDOA goes one level further with that, and will actually give us a distance, so it will say, that phone is connected to Cell Site 6, Sector 1, and it's 1.6 miles away or it's 3.4 miles away, but it will actually give us how far the device is from the cell site.

Verizon and T-Mobile, Sprint before the merger to T-Mobile, all provides these TDOA records. And where these really unique is it actually will show us how far away a cell site is from the cell phone when that cell phone is connected. Over the years we have collected and created a database with well over 25 million of these TDOA records.

What that gives us the ability to do is to go in and query a potential cell site and say, okay, we look at these 25 million records on Cell Site Number 6. What is the furthest connection we have ever seen on Cell Site 6? And maybe it comes back at 3.2 miles. We then look at our database and say, okay, what are we estimating that hand-off range. We are estimating the hand-off range at 3.3 miles. Okay. Perfect. We have never seen a TDOA connection beyond this range. And by doing that in combination with the drive testing, we actually have a very easy to replicate way of testing the accuracy and the known error rates with our estimations.

Q. That was going to be my next question is: Can this be replicated? So tell us about how you can replicate the data.

A. It can be replicated. And what is interesting is when get certain cases, such as this case, you can actually replicate the data with your data. You don't necessarily even need our tower database or our TDOA databases.

In this particular case, you have just regular historic CDRs, call detail records, that give us just a cell site and sector, but you also have timing data, you also have Google data. And what we like to look for when we get these types of records is, the exact same thing I just explained. Do we see the TDOA reports that were obtained in

this case? Do they extend further than our estimated hand-offs? And if they do, how much further? Do we ever see that the Google data does not align with the call detail records? Are we seeing the phone is somewhere else connected to wifi or a GPS hit through Google, yet our mapping isn't accurate with it? We call that corroborative data. Whenever get multiple data sets and overlay these layers, it actually allows us to replicate our estimations to see the accuracy right there by its own data.

10:31:03

10:31:20

Now, this is a very small data set in the big picture of things, even though it might be 90 days and 50,000 data points, that's relatively small data. I would never go into court and testify to the accuracy of ZetX's capabilities just based on that size of a data set. But when we start looking at 25 million estimated ranges in our database to 600 million phone calls that we have mapped over the last seven years, now we start to get that data size where we can speak to some reliability and accurately throw numbers out and say hey, we are 95 percent accurate, it's not on this one case that happens to be in Grand Rapids, it's throughout the country with all of the different providers that we see.

10:31:39

10:31:57

Q. You briefly touched on this already, but will you tell the Court a little bit more about the peer review that has been done of the TRAX software?

10:32:10

A. Sure. So and I'll touch on a couple different peer reviews, because I think it's really important to understand. We are a big big advocate of peer reviews. We encourage peer reviews on a regular basis, and although our primary customer is law enforcement, it's probably worth noting, we do have defense experts as customers, we do have defense attorneys as customers. Some of the peer reviews that we do are actually with defense experts. So it's not just a peer review where I'm going to reach over to my buddy in the cubicle who works next to me, we try to get outside of the different fields within law enforcement to do these peer reviews. However, about three years ago, we had an individual -- Mr. -- I'm going to butcher his name, and I apologize to the Court for doing this, I think it's Filipo Sharevski is the name. And essentially he is a Ph.D. in cybersecurity. I think he got his Ph.D. through Purdue and he now teaches for DePaul, but he did an analysis of our mapping, how it takes the raw records and creates these visualizations, and then how those visualizations could be used in court and how they can impact court proceedings. And he printed this book, I believe the name of the book is Mobile Network Forensics, if I remember correctly, and then he had some other little tag line underneath that. But essentially he concluded that this is probably the best way to be able to show a trier of fact in laymen's terms what

these complex records look like.

At the end of the day, you know, I heard earlier today, you know, we have got 50,000 data points. Well, the real secret here is how do we get a jury to understand what this data means, not necessarily prosecution or defense and the judge, but the visualization to a juror to really understand what the possibility is if this phone connects to this cell site, what does that mean? And over time, what do those patterns mean? And it was his conclusion that this is one the, if not the best solution out there, to be able to show to jurors and have them understand this very complex data.

Q. What sort of review was done of the TRAX product before ZetX was acquired by LexisNexis?

A. I would like to tell you that it was a very simple process, but the acquisition took well over a year to go through. There was an extreme due diligence period. I'm sure you can imagine a company like LexisNexis is only going to do their homework on how things work, but the other piece of this too is that we -- LexisNexis is actually foreign owned, they are owned by a company out of England, so we had to go through what is CFIUS, which is the Committee For Foreign Investments in the United States, and it's actually a committee that is headed by Congress. But there was a very intensive due diligence process of us having to go

through and expose everything. I think we turned over well over 55,000 documents, and we had to basically show there is validity behind what we do, right. That there is actual value, and it's not some kind of voodoo witchcraft.

10:35:30 Q. All right. Let's talk specifically about the TRAX exhibits that were generated for this case.

You have a copy of Government's Exhibit 25H in front of you or accessible to you?

A. I do.

10:35:49 And you know what, I apologize, I'm going to go back. I probably should have provided a little bit of context on that last question --

Q. Okay.

A. -- you asked as well.

10:35:56 We have pretty much every federal entity in the United States using our products, and that's why the CFIUS review was such a big deal, is we had the FBI, The Secret Service, the U.S. Marshals, Agriculture, Department of Treasury are all using this product, and as a result, we had

10:36:16 to go through this due diligence process to actually show that this information that is actually being used by the federal government is accurate and reliable and can actually be relied upon.

And as far as that exhibit, I do have it, and I do

10:36:29 have it in front of me, 25H, as in Henry.

Q. H as in Henry, yes. Thank you.

MS. SANFORD: To make this easier for I.T. purposes, your Honor, we are only going to look at the hard copies of the exhibit, it won't be displayed on the screen. Thank you.

10:36:43

THE COURT: Okay.

BY MS. SANFORD:

Q. Let's talk about the shape of this green overlay on Exhibit 25H. In traditional cell site mapping, would we have just drawn essentially a 120 degree angle coming out from the cell site?

10:36:56

Are you muted?

A. I'm sorry.

We would. And essentially this is a Verizon record here. So in Verizon's cell site list, they would tell us that the actual beam width of this sector was 120 degrees and that would be referenced on the map typically with this wedge shape that represents what 120 degrees looks like with pointing in the direction that the azimuth is or the antenna is actually pointed in. The scientific working group on digital evidence actually does a great job to explain the difference of the wedge shape to what you're seeing here, which is called the horizontal plane. And the scientific working group of digital evidence actually says we have what they call the optimal beam width and the actual beam width.

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The wedge shape represents what is known as the optimal beam width. It's basically where the cell site -- it's anticipated that the cell site has its strongest coverage in that hundred and twenty pie shape. However, the actual beam
10:38:10 width is much beyond that, and that's where we start to get in what is call sidelobes and rearlobes where we could get a little bit of reflection off a building next to a cell site and actually bounce some of that signal behind the cell site or to the sides of the cell site. So one of the problems
10:38:28 that we found when we very first began ZetX and our drive testing is we were using the wedge shape, and every time we would go out and do a drive test, the drive test data just was never anywhere close to looking like a wedge shape. So I had an issue, at least in my own opinions, of some
10:38:44 credibility where I am mapping using this wedge shape, but then I go out and do these forensics exams in the field by drive testing, and it never corroborates these wedge shapes. So, in doing some research, we found that there's what is called an anechoic chamber. And what an anechoic chamber
10:39:03 is, is it's a -- basically think of it like a sound booth, but instead of sound, it really focuses on radio frequency energies, and it can actually prevent energies from bouncing of the walls. It's these very secure rooms. And I can put an antenna in one of these rooms and power it up, and there
10:39:21 is very sensitive sensors that will actually kind of map out

what the footprint of the energy coming off of that antenna looks like. And you can look at it straight down horizontally, which is the radial frequency horizontal plane, or you can kind of look at it as a cross-section vertically, which would be the radial frequency vertical plane.

10:39:39

So this shape that you're seeing here is not something that was created by ZetX. It is not something that ZetX just came up with one day and started with our mapping. It is a known shape that is created from this testing in anechoic chambers that is already accepted throughout the relevant scientific community. If you read any documents on antenna patterns, if you start to do research on how these antennas will actually radiate this energy, you will see this shape, or a very common shape to this, come up in all of the different readings and scientific documents. And the best scientific document that I can refer the Court to is what is called the Basta Project, B-a-s-t-a Project. And the Basta Project is actually a standardization throughout the industry of coming up with scientific ways to test equipment, specifically cell tower antennas, so that if I buy an antenna from one manufacturer versus another manufacturer, there is some type of consistency in the testing and specification sheets that are created by those manufacturers, and Basta standards

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actually use this same shape. This shape is also used by other defense experts in field that do criminal work. So for example, there's a company called Cherry Biometrics, and it's ran by two individuals who used to do a lot of radio frequency work for NASA. They testify on a regular basis for defense attorneys as it pertains to this type of evidence, and they will use the same shape. There is another individual named Dr. Vladan Jovanovic. And Mr. Jovanovic actually wrote many of the patents that are used in cellular technologies today to include that TDOA technology that I was talking about before. He has retired from the electrical engineering side of the house within the industry and now does testimony -- for expert testimony and mainly for defense attorneys, but he also uses this same shape to represent what this radiation pattern looks like when it emanates from a cell site.

Q. And part of the reason that this pattern exists is because ideally cellular providers want there to be overlap between sectors so that you never have dropped calls or no coverage; is that correct?

A. A hundred percent. And if you go back to the wedge that you explained in the beginning, if that wedge is 120 degrees and there's three of them on a cell site, some simple math tells us that there is no overlap, which is, you know, the first sign that something is wrong. The entire

cellular network is based as a mesh network. And what a mesh network means is it's based on overlaps. I never should go, you know, out of one coverage area into a dead zone to another coverage area, especially in an urban area. There should always be multiple cell sites, multiple antennas providing coverage in that area.

Q. So we talked about how this shape is determined. Tell the Court a little bit about how the size of this shape is determined.

A. Sure. So if we look at the 25H, there is a black dot that is inside of that green shape, it's just to the east of Fuller Avenue, NE. And that black dot is going to be the actual location of the cell site. What we do is we extend a cone shape from that black dot, the direction of the azimuth. And in this case, the azimuth is facing due west, so that antenna is pointed to the west. The cone -- the point of the cone would start at that black dot and would extend to the west and it approximately a 60 degree cone, and our system actually looks at a 60 mile range, now we wouldn't need 60 miles in this case because of how many cell sites are located in this area. Once that cone is actually drawn, if you will, this geographic shape, we then look at how many other cell sites fall within the cone and then the estimated range from this cell site to all of those other cell sites. We come up with an average of both how many

cell sites are in the area and the average distance of those cell sites to this cell site. And then basically we have an algorithm where we take that distance and we times it by a value, and that value is where we can adjust from our drive testing, that will give us an accurate estimation of hand-off area.

10:43:58

And it should be known this hand-off area is usually just a slight bit larger than what we would typically see in the field. And the reason for that is if we are going to err on, you know, when you start talking about error rates and what is the accuracy, if we are going to err on this type of technology, we are much better to err slightly larger than slightly smaller. I would much rather come into a setting like this and be able to say I feel very confident that the device is within that shaded area than to say well, it could be slightly outside, our sizing here is too small. But essentially that is how we come up with the range.

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Now, these ranges will change on a regular basis, which is why archive our database. As more cell sites are added in the area, our system is constantly running these ranging program where it will actually archive, okay, here's what the network looks like today. Two weeks from now we see that Verizon has added four cell sites into this area, that's going to have an impact on the sizing, and it will

10:44:48

10:45:08

archive, it will rearrange everything and it will archive to that point as well.

Q. This green overlay then represents the hand-off area?

A. That is correct.

10:45:24 What we are saying here and what is being represented on the map is, it's important to note here as well, this is the moment that the phone connects. All right. So there is going to be a connecting record and then a disconnect. So this particular call I can see the

10:45:40 duration is eight seconds. So the moment that the phone connected, the phone connected to this cell site, this sector, we would expect it to be in that green shaded area. Eight seconds later, when it disconnected, it could be a different sector, it could be the same sector, it could be a

10:45:57 different cell site altogether. But yes, the representation here is showing that on this date, at this time, which is 8/20/2019, at 6:33 p.m., the device connected to this cell site for an outgoing call, it connected for a total of eight seconds, and it connected to Sector 3. We anticipate or

10:46:14 expect with a 95 percent accuracy that that device is inside the green shaded area at the time of that connection.

Q. Is this hand-off area comparable then to the use of something called granulization?

A. I think you're referring to the Evans case, United States v. Evans. Essentially what came up in the Evans case

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was an older style of mapping, and the judge in that case defined it as granulization. Granulization is not a reliable method. We do not use granulization.

I could give you an example of granulization, number one, is it's looking at just one other cell site, not the tower density as a whole. The second piece of this is it comes up with just this -- the time is just kind of an arbitrary figure of, if I measure the distance from this cell site, so if we go back to that black dot on Fuller Avenue, let's say the next cell site is right at College Avenue. And for the sake of argument, we are going to say that's a mile away. Granulization is this concept that I can measure from my target cell site here to the next cell site which is over there by College Avenue in my hypothetical scenario, and that that distance is one mile. Granulization is well, 70 percent is a good number to say that you get 70 percent overlap, so I would estimate the range of this cell site 7/10 of a mile.

You know, it had its place in law enforcement. It isn't necessarily that it's a horrible way to look at cell phone records, but for trial purposes, for forensic sides of the house where we have to start validating, there's a lot of errors. The error rate was extremely high using that format, especially now if you go to a cone shape instead of this horizontal plane, you're really cutting off some

potential areas that this device could be. Which, at the end of the day, let's not make any mistake, if we are using this type of mapping and records, it's because we are interested in the location of a device at a particular dime.
10:48:24 So if we know that we are underestimating what that range or what that space could be, it's extremely problematic, and that was the issue with granulization. It was kind of a good rule of thumb, but the accuracy was pretty accuracy weak on it. I would say your accuracy is probably well
10:48:40 under 60 percent, and just there is better ways to do this.
Q. The one difference between what granulization involves and what TRAX does is instead of just considering two cell towers, you consider all of the towers in the relevant area?
A. Correct.
10:48:56 And now with that update that we talked about, specifically the cell cites that impact this sector as it sits, which will be different than Sector 1 or Sector 2, if we were to map all three sectors of this particular cell site, you would see that that shape that's on the map right
10:49:14 now would slightly different for each side of the antenna. So granulization a lot of times wouldn't necessarily take that into a factor as well. So there is kind of two different ways that we look at it there.
Q. And then just briefly, you've had a chance to review
10:49:31 the exhibits that Detective Heikkila prepared in this

matter. Exhibit 25, the video, and then the screen shots?
A. I have.
Q. And you also had a chance to review the -- at least at a broad level, some of the underlying data?
10:49:49 A. I have.
Q. And were you checking for any anomalies or aberrations?
A. Yes. So typically what I will look for on a case like this is, I don't know any details of the case, I don't know anything about the defendant, I don't even know what the
10:50:05 crime in this particular case involves. So what I'm looking for is, do we see anything that is really standing out that could be problematic that we need to go back and look at the data better. For example, we see a device travels 20 minutes -- or 20 miles in five minutes, that could be a
10:50:22 problem. We see that the RTT or the TDOA data isn't aligning with the horizontal planes here. We see that the Google data is on one side of the town while the Verizon call records are on another side of town. Like I said before, we are looking at that corroborative data, and are
10:50:43 we seeing that these datas -- these data points, when we layer them, are they actually corresponding with each other and do they make sense? And in this case, they do.

Probably the other thing that we should at least mention is, I saw that these records were ran originally in,
10:51:00 I think it was February of 2020, which is going to be just

prior to that update that I talked about, but then they were also ran after that update, as well. So just for clarification, that should probably be noted. That I have seen that these records have been ran since our update as well.

MS. SANFORD: One moment, please, your Honor.

(Pause in proceedings.)

MS. SANFORD: I have no further questions.

Thank you, Mr. Ray.

10:51:26 THE COURT: Mr. Tilton, you may inquire.

MR. TILTON: Thank you, your Honor.

CROSS EXAMINATION

BY MR. TILTON:

Q. Good morning, Mr. Ray.

10:51:43 A. Good morning, sir.

Q. I'm going to wait for a screen to come down.

We have previously spoken by phone?

A. We have.

Q. And now you own -- When did you start ZetX or TRAX?

10:52:15 A. I started building the TRAX program in 2012 is where I can say I started actually creating the product itself. I retired in May of 2014, and we actually sold, I think our first version of TRAX, I want to say January of 2015.

Q. And as you developed your company, you owned it until

10:52:45 May of 2021?

A. That is correct.
Q. And as you developed it, it's a software subscription; is that right?
A. It is. It's what we refer to as a SAAS model, which is subscription as a service. We sell it as a yearly subscription, unlimited user, with unlimited use, whatever entity buys it, they can -- we give them a price based on the size of entity and they have unlimited access to it for the duration of the calendar year.
Q. And that's something that you started when you owned the company and it has continued going forward, right?
A. That is correct.
Q. And we will get a little bit more into the specifics of the website in a minute, but generally, someone uploads records to your website, and then they can download them, right?
A. Yes. I think probably a better way to describe that is we have an interface on our website that allows customers to ingest these records to our processors. Our processors then pars the data and create mapping files, which are these KMZs. Just for the record, the KMZs is keyhole markup language zip, it's the type of computer code that Google Earth reads. And then just like you said, our site then allows them to download where they can download these Google Earth files to see the visualization.

Q. Now, when you started the company, you created a website?
A. We did.
Q. And you maintained that website, until you sold the company, right?
A. We still maintain the website.
Q. Okay. Has the website changed since you sold the company?
A. Multiple times. Oh, since -- we pushed an update -- My answer is going to be yes. I can't get too detailed on when those changes -- we just changed some of the GUI, so GUI is graphical user interface. We have changed some of the GUI and we updated a handful of things. We are also going through a process of what is called single sign on, that will allow LexisNexis customers and ZetX customers to use one sign on for multiple products, so some changes have been made there as well.
Q. So we are going to look at a couple screen shots of the website.
MR. TILTON: I would like to pull up Defense Exhibit R.
We have some exhibit books.
BY MR. TILTON:
Q. Are you able to see Defense Exhibit R?
A. I am. And it probably, just to keep the record clear,

we have multiple websites. This is the home page of one of those websites. The URL, the address if you will, for this particular website that you have on Exhibit R is standard.ZetX.com. This is not a website that we use for ingesting records like we described earlier, which is why, for the record, I want to make it clear, this is a different site other than the site we were talking about earlier.

Q. So this is a site that you created though when you owned the company?

10:56:42 A. A hundred percent.

Q. And specifically this web page?

A. Specifically this web page.

Q. And so this is sort of a sales page for someone who wants to learn about ZetX, they might come to this page,

10:56:59 right?

A. Actually, no. The reason that we created this page is exactly what we are doing today here in court, is we get a lot of questions from both prosecutors and defense on, hey, how do you guys create these ranges? Where did this shape

10:57:15 come from? What is some scientific documentation that you can show that you rely on? How do you guys come about these accuracy? So we actually built that particular page to show our standards, that's why we call it standard.ZetX.com. It's meant for people like yourself to go to. There is about a

10:57:34 45 minute video that walks through very similar explanations

as my testimony today, and then if you scroll to the bottom of that page, you're going to see, I think there's about eight different documents that we reference, that we allow you to download as reference. We want to be able to say, 10:57:50 hey, when we say we are peer reviewed or we saying that we are relying on this, or we say this other defense expert is doing the same things, we don't want it to be just lip service, so we actually give you the ability to go in and research these different documents and these different 10:58:04 scientific findings that we refer to. It's basically our answer for Frye or Daubert style hearings to allow people like yourself and the prosecution to help kind of educate themselves for the processes.

Q. So on this page, there are four sort of white papers at 10:58:28 the top?

A. Sure, we can call them white papers.

Q. And then you have -- you testified about the next two boxes describe Cherry Biometrics, right?

A. Correct. I referenced them earlier, and that sample 10:58:43 report is an actual sample of them using the horizontal plane as defense experts. Correct.

Q. Okay. So they support the TRAX software?

A. I can't tell you what their opinion on the TRAX software is. They -- they are independent subject matter 10:59:05 experts who like to charge a lot of money for creating work

products, so I'm not going to tell you whether they would do that with my product or not. But they use the same scientific methodology as the TRAX product.

Q. And you've offered them on your page as support for your product?

A. I have not offered them on my page as support. In fact, if you watch that video, that 45 minute video, I'm very specific in the fact that we want to make sure that when we are looking at Frye or Daubert style challenges that, you know, one of the components that we need to look at is the methodology accepted throughout the relevant scientific community. And we get into a really interesting debate here when people ask me well, you're an expert, who is the relevant scientific field? If my answer is law enforcement, I'm kind of failing that representation before I begin, because what is law enforcement's background on scientific mapping of radio frequency? Right. It kind of creates this conundrum of well, sure, all of law enforcement uses it, but are they really the relevant scientific field. So in trying to answer that better, what we have done here is we've gone out and we've shown Ph.D. level radio frequency engineers, who are now doing defense work, that are using the same methodologies. And I think it's fair for us to say at that point that we have found people outside of law enforcement who are doing similar type work using the

same principles. And that is the relevant scientific field.

So what we represent here is that somebody like Cherry Biometrics or Vladan Jovanovic are members of this scientific field when it comes into hey, how are these processes done?

Q. So they follow the same scientific process and methodology as you?

A. They use the exact same radio frequency horizontal plane as we do opposed to the wedge shape. And, in fact, in both of those reports, you'll see that both of them actually question the accuracy and the reliability of the wedge shape, and that they feel the radial frequency plane is actually a better representation.

MR. TILTON: Your Honor, I move to admit Defendant's Exhibit R.

MS. SANFORD: No objection.

THE COURT: Received.

BY MR. TILTON:

Q. Now, I want to go back up to the four white papers -- what I'm calling the white papers at the top. None of those are specific to ZetX or TRAX; is that right?

A. No. Again, these would be relevant documents that get into the scientific field that we are talking about today. So they are just white papers or some type of a research paper that has been published or offered as some form of,

you know, reliability showing different methods and manners in which this type of evidence can be presented.

Q. Now, you've also these -- All of these reference materials include links, correct?

11:02:15 A. They do.

Q. And let's go to Defense Exhibit X.

So this -- Do you recognize this?

A. I do. That would be the report in reference to the Cherry Biometrics based on the side there.

11:02:49 Q. And can you tell me the name of the defendant in that case?

A. You know, I can't read it here. I believe if I remember right, it's Felix and maybe Aguillar.

Q. Ayala sound right?

11:03:04 A. Yes, that could be it. It's just really blurry on my screen.

Q. That was a case where both you and Cherry Biometrics were experts; is that right?

A. That is 100 percent accurate. Cherry Biometrics was

11:03:21 representing the defense and our company was representing prosecution.

Q. And Manfred Schenk testified for Cherry Biometrics?

A. That is correct.

Q. And Manfred Schenk has graduate degrees in -- well, he

11:03:42 has various engineering and graduate degrees, is that true?

A. It is true. He is a pretty smart guy.
Q. He is a qualified expert in the field?
A. Absolutely. I have had Mr. Schenk on a number of different cases that I've worked as well. I know that he
11:03:58 has testified throughout the country as an expert in this field in both state and federal courts.
Q. And he testified in that case that in his training and experience, the ZetX program is not reliable, is that true?
A. I know that's not on the document that you're
11:04:16 referencing here. Because of the rule, I was not allowed to be in the courtroom during all of his testimony. So I can't tell you specifically what he testified to, but I have not heard that before, nor has he tested or evaluated the ZetX program at the time of that testimony, so if he did testify
11:04:34 to that, I would challenge to what he is basing that opinion on, and if he has actually tested the system enough to make that opinion.
MR. TILTON: Can we look at the testimony from the Ayala case on Page 2,436--
11:04:50 MS. SANFORD: Objection, your Honor. He said he wasn't present for the testimony, so I don't know how we can impeach him with something he never heard.
THE COURT: Response, Mr. Tilton?
MR. TILTON: He was not -- He said he wasn't
11:05:03 present. I can ask him some more questions about it.

THE COURT: Sustained.

BY MR. TILTON:

Q. Now, Mr. Schenk believes in the horizontal plane, but he also believes in invariant plane, isn't that true?

11:05:20 A. He will commonly -- I can't tell you what he believes in or doesn't believe. What I can tell you is that Mr. Schenk's testimony is very consistent in that he feels all cell sites potentially cover 31.2 miles. And typically when he is used in a criminal case, it is to say that all cell

11:05:40 sites have the ability to cover this 31.2. The problem with Mr. Schenk's testimony as it relates to that is he doesn't do drive tests, and if you get into any of his testimony with drive testing, he'll admit that he doesn't do drive testing. So we have about 2.5 million drive tests that will

11:05:57 actually tell you Mr. Schenk's testimony in reference to coverage ranges is highly inaccurate.

The second piece there, if you just think about the complexities of LTD networks in 2020, there is absolutely no reason for Verizon to deploy, you know, 20 towers in a

11:06:16 downtown area if each tower could cover 31 miles.

So as far as the distance, if that's what you're referring to, that's been my experience with Mr. Schenk, and the cases I've worked involving him.

Q. So he believes that a horizontal plane should stretch

11:06:31 out to up to 30 miles and would then cover a much larger

area than you would?
A. Well, potentially or smaller area. We have cell sites in our database that absolutely cover 60 miles. I have been involved in testing where I have been 60 miles from a cell
11:06:50 site and made a series of test phone calls to show that that cell site could reach 60. So I think it's important to understand that the issue with Mr. Schenk's testimony on that is that it's consistent no matter which cell site. My argument would be there are cell sites that cover
11:07:05 potentially cover twice the area he would account for. There are other cell sites that potentially cover less than ten percent. You can't represent every cell site the same is my position.
MR. TILTON: Your Honor, move to admit Defendant's
11:07:20 Exhibit X, please.
MS. SANFORD: No objection.
THE COURT: Received.
BY MR. TILTON:
Q. Now, you also list Dr. Jovanovic on your resume.
11:07:35 MR. TILTON: We can take this one down.
BY MR. TILTON:
Q. I mean on your website, excuse me. On your website, excuse me, go ahead.
A. Correct. No, that is correct, not on my resume.
11:07:45 Q. And Dr. Jovanovic has been an expert witness opposing

you in a number of cases, is that true?
A. He has. Well, I believe in just one case opposing me. But I should clarify, he's never testified opposing me.
Q. Did the case -- Was the case that he was opposing you in the Clayton case out of New York?
A. He was a defense expert that was hired in the, I guess, preparing of that, and he wrote some different opinions opposing my testimony or what he anticipated would be my testimony. But it should probably be noted, Mr. Jovanovic never did testify, nor was he ever in front of that court in that particular matter.
Q. But you reviewed the documents that he prepared?
A. I have, 100 percent.
MR. TILTON: Could we pull up Defense Exhibit OO, please.
BY MR. TILTON:
Q. Do you recognize this as a document that Dr. Jovanovic prepared for the Clayton case?
A. It's blurry. I have no reason to doubt that it's what you represent it to be. I know he did prepare one. As far as my ability to read this right here, I can see his name, so it looks like it's from that case. I have no reason to assume it isn't.
Q. You recall he prepared an affidavit?
A. I think he prepared multiple.

It's probably important to note that that case has gone through several different layers of appeals, all the way up to the New York State of Appeals. And I believe he prepared affidavits for multiple of those appeal hearings. So as far as which one this is or how it relates to that case, I can't tell you just on this. But I am aware that he did prepare what I believe is multiple affidavits.

Q. Could we look at Page 5. And one of the titles of one of his paragraphs there is, "The Misleading TRAX Presentation of Data Without Coordinates," does that sound familiar?

A. That does sound like something that he wrote, correct.

Q. And he said that, "Placing the calls in these ameba shapes based only on the antenna horizontal radiation pattern and tower density has no basis in science or in any practices applied by RF Engineering professionals in their work even for the crudest of approximations."

A. Yes. That was actually, I can tell you that is exactly what he wrote. I also believe that is the reason he didn't testify, because that report that's on that standard.ZetX dot.com, if you open up that report and you go to Page 18 of Mr. Jovanovic's testimony on that case, he actually tells you how the radial frequency horizontal planes can be used very accurately to show coverage areas, which is in complete obvious issues with what he said there. So yes, in that

particular case, where he didn't testify in Clayton, he did make that assumption. However, there's been other cases that he's actually said the exact opposite. So I guess you could take your choice of which one you want to refer to.

11:11:56 Q. I just want to look at Page 10 of this exhibit. And you see his signature there?

A. I see a signature. I have no reason to believe it's not his.

Q. So again, in this case, his conclusion is, "The

11:12:14 fundamental problem with the presentation made by the expert witness is twofold; one, it's reliance on source data for which there are no accuracy guarantees and for which the lack of access to the proprietary algorithms and to the underlying raw measurement information and transmitter

11:12:32 databases used renders impossible any testing and verification by outside experts in violation of generally accepted scientific principles." That's his first opinion on your presentation?

A. I believe that is an opinion he made. I think it's

11:12:53 extremely problematic, and so did the courts, because none of the items that Mr. Jovanovic brought up in this case were suppressed or ruled out, and this case was held up all the way to the New York Court of Appeals, also found that we did have testable accuracy. So yes, that is what it concludes,

11:13:17 but I think it's important to note, that is not his

testimony. That is a document that he prepared that was filed in a motion, and Mr. Jovanovic never actually appeared before the Court in that matter.

Q. His second --

11:13:31 A. Nor was he ever cross examined to support why those are his conclusions. His cross examination would not have gone well, because as I've explained today, our processes are absolutely verifiable. They can be recreated very easily. There's drive test equipment out there that we can show or

11:13:53 provide to different people to actually go out and do their own independent testing.

THE COURT: Mr. Tilton, do we know whether this conviction was affirmed by the highest court in the State of New York?

11:14:04 MR. TILTON: I believe that it was confirmed -- or affirmed.

THE COURT: Then what is the relevance of this? If the highest court in the State of New York found that the government's presentation in that case made the Daubert

11:14:20 Standard and they affirmed the conviction, I'm having a difficulty understanding why this is important.

MR. TILTON: Well, this --

THE COURT: Under those circumstances.

MR. TILTON: Your Honor, my understanding of when

11:14:31 Dr. Jovanovic came into that case, was that it was after the

Daubert proceeding, that he came in at a later stage and presented this testimony. I think it's relevant because --

THE COURT: Well, it's not testimony, it's an affidavit. So it was after conviction, but before affirmance?

MR. TILTON: I believe so, your Honor.

THE COURT: Well, same question.

MR. TILTON: So the relevance goes to --

THE COURT: The highest court in the State of New York affirmed the defendant's conviction based apparently on the TRAX data, at least in part, and I assume that the defendant had qualified counsel to challenge that in the appellate courts of the State of New York, and apparently the appellate courts didn't find a problem. So my question is: Why is this affidavit relevant to this proceeding?

MR. TILTON: So Mr. Ray relied on several sources for peer review. One of those sources was the Dr. -- or the professor out of Purdue, and then he talked about Cherry Biometrics, which was on his website, he talked about this on direct, and talked about how they testify regularly on this issue, and he used it to support his technology. He then talked about Dr. Jovanovic and the patents -- he talked talked about his background, he put his resume up on his website, and if he is relying on his opinions and on his qualifications, I think the fact that Dr. Jovanovic has at

least signed an affidavit that would suggest that he does not agree with that is relevant.

THE COURT: No. Move on.

Under the circumstances that the case in which he executed the affidavit was affirmed by the highest court in New York, and apparently the testimony is that the person who executed the affidavit never was subject to cross examination either. So move on to another subject.

And I think we lost the witness. At least we lost the video. Or the --

THE WITNESS: I'm still here.

THE COURT: Okay. Good.

Go ahead, Mr. Tilton.

BY MR. TILTON:

Q. All right. Now, when you sold your company to LexisNexis, you said they did a lot of due diligence, is that true?

A. That is correct.

Q. They didn't produce any kind of report about the reliability of the TRAX software specifically, did they?

A. I can't speak to what internal reports they produced or didn't produce. I can't speak to whether those would even be something they would be willing to release. I can tell you that they did an analysis on all of the different cell phone mapping providers in the United States and came to the

conclusion that the ZetX product was the most valuable for their business purposes. How they came to those conclusions, I can't answer for you. And I can't say to what extent they documented that in an official report. They spent a lot of money buying us, so I'm sure there is some documentation out there somewhere that they found it to be reliable.

Q. Now, you mentioned a professor from Purdue who had written a book and included some information specifically about TRAX, correct?

A. That is correct.

Q. And that book is not included on reference materials from your website, is that true?

A. That is correct. I do not have that book there. We just haven't added it, plus I can't really add that book as download. I think it's like $120 for the book. I think I'm getting into some copyright issues if I try to provide some type of a download of that material.

Q. I would like to look at, talk a little bit about the TRAX website itself. So I would like you to look at Defense Exhibit B, please.

MS. SANFORD: B or D?

MR. TILTON: B.

BY MR. TILTON:

Q. And I'm wondering if you can walk me through the

process of how someone uploads files and how this page is relevant, if you recognize it, to that process?

A. Okay. So this would be the second page that comes up during the upload process, but I'll trying to explain the best I can.

11:19:41

The first page, there is some very basic fields you have to complete, such as -- you have to name the case, put in the target phone number, choose which color you want it to appear on the map. Some minor things like that. The time zone. We want you to make sure you're mapping this in the correct time zone.

11:19:55

You see the dark gray box in the center there, it actually says, "Drop files here or click to start processing files." If you click on that, it will actually open up like a file explorer, or I could just have File Explorer open and I've got my Verizon zip file. I can just click on the folder, drag it over to the dark gray box and let go of my mouse button, and it will drop into that box. And in the background, what is happening there is those records in that zip folder or regular folder are uploaded to our processors, the processors begin to pars that data. What I mean by pars the data, is a processors will actually start to examine that line-by-line, row-by-row, and usually within the first two or three rows, we recognize it to be Verizon records and it's particular type or T-Mobile, and that will initiate the

11:20:08

11:20:25

11:20:42

actual processing that we have developed for that particular record set.

At the end of that processing, basically all of the data is written to a KMZ file, which is a Google Earth file, that will allow for a download. And we also have what we call Linx reports, which are some analytical reports, super basic, it will break down the records for you to say basically, you know, where are the most calls being made, what day, what hour, the references of text to voice, just a number of different analytical reports that will help you digest what you're seeing in the records.

Q. I would like to have you --

MR. TILTON: Move for admission of Defense Exhibit B.

MS. SANFORD: No objection.

THE COURT: B is received.

BY MR. TILTON:

Q. I would like you to look at Defense Exhibit D.

I know it's -- I would guess it's blurry on your end, but does this look like something that is generated after the records are processed?

A. It looks like an email. It is extremely blurry. Based on the formatting I'm seeing, and if we are just talking in reference, so let me re-address this. Let's say that you were to ask me, once those records are done completing, is

any type of an email sent out? Yes. And the end user who processed these records will receive an email that will actually tell them what was processed, if it was properly processed, if we had any missing cell sites. Every once in awhile we will get missing cell sites, at which point we will explain to the end user, hey, you need to go back and contact Verizon and get the cell site information for these following cell sites, because they are not in our database.

But what -- if I'm looking at this properly, it appears to be one of those emails that is received after somebody processes records.

Q. It verifies everything they've processed and what has been successfully processed?

A. Yes. You know, a lot of times it's interesting because people will be confused that, you know, they look at this folder they got from Verizon and there is 12 different files in this folder, they load that folder into our system and we only produce three mapping files, and they get confused and they'll hit us up, and they'll be like hey, I loaded 12 and I only got three, what is the reasoning there? And if you look, I can't see it, but if you would look at that exhibit you have, there is probably a breakdown of the type of records, so like there might be subscriber information in there, there might be some other reports, and it will actually tell you, hey, there is really nothing we can do to

map this particular record set, because it's just subscriber information, or hey, yep, this is a phone record and we created a Google Earth download. So it's kind of a summary to help the end user understand why they may have Google Earth files, why they may only have a Linx report or why there was no work product actually created.

MR. TILTON: Move to admit Defense EXHIBIT D.

MS. SANFORD: No objection.

BY MR. TILTON:

Q. So I would like to look at Defense Exhibit I next.

THE COURT: D is received.

MR. TILTON: Thank you.

Trying to move it along.

THE COURT: That's okay.

BY MR. TILTON:

Q. Looking at Defense Exhibit I, do you recognize it as a different type of email that is sent when files are processed?

A. Yes. So where I said before sometimes we may have a missing cell sites, this is the missing cell site email. And basically what we are saying is, hey, we've looked at your records, and we are missing a handful of cell sites for Verizon. Now, you know, we leave this up to the end user to determine is this valid. You know, if I have 90 days worth of records and I've got 50,000 data points and I'm missing

20, and those 20 have nothing to do with around the time of my crime or any other relevant point in the investigation, you know, do we need to go back and go get those cell sites and reevaluate and see what is going on there. We don't know. So, and I can't read again what this says, but there's probably some instructions to the effect of, hey, if these are relevant or important cell cites, you are going to need to contact the cell phone provider and obtain these specific cell sites, as far as the information for those cell sites. Once you get that information, shoot it over to us and we will add it to our cell tower database and you can reprocess the records.

Q. And so it's provided to the end user and it gives the end user some choice in how they want to proceed?

A. Absolutely.

Q. And at times, are there other emails that are generated if you're -- Let me back up.

You have support staff working for you as well, right?

A. We do.

Q. And one of the roles -- some of your support staff is to see when errors are flagged in files?

A. We do. We have a pretty robust support system that anytime there is a failure, it automatically creates a support ticket so that we can see, hey, why did the system

fail here. The overwhelming majority of the time it's either end user issues where they like, for example, if you enter one phone number, but you load the phone records for a different phone number, that's going to create a failure, because you're looking up the wrong number.

Yes, anytime there appears to be an issue in interpreting the records or failure in the records processing itself, it creates a support ticket.

Q. And that ticket is memorialized in the form of an email to the end user?

A. It is. And a lot of times it can be -- there will actually be a number, a support ticket number that's also referenced in that email so that the customer can relate back to a particular issue.

MR. TILTON: Move for the admission of Defense Exhibit I.

MS. SANFORD: No objection.

THE COURT: Received.

MR. TILTON: All right. We can pull this down.

BY MR. TILTON:

Q. Now, ZetX offers a lot of different training programs, is that true?

A. A couple. Yes, I don't know if I would say a lot, but we do offer a few different classes.

Q. And who primarily leads those?

A. Right now we have an employee by the name of Zeb Dishman, who is our primary instructor on those, and then I teach on occasion. We also have an instructor by the name of Michael Pazelli, Craig Garcia, and at times a Judy Fernandez.

11:27:26

Q. Did you develop all of those trainings?

A. I developed portions, depending on which class. Those other instructors have also contributed or developed portions of the courses as well.

Q. And have you identified a number of best practices in using your software?

11:27:39

A. We have. As a company, we embrace a number of best practices that we have found specifically as it relates to today, if we are going to use these records in a court setting, we have some best practices that need to be observed and kind of adhered to, to ensure that we are properly representing this evidence in court.

11:27:59

Q. Can you tell me what some of those best practices are?

A. Well, for example, you referenced one earlier in the hearing, as far as the date range. We want to see at least 45 days, if not more. And the reason for that is, you know, am I mapping something that is significant to the crime on the day of the crime or am I mapping a repeating pattern that just so happens to align with the crime. If I'm going to come into a courtroom and provide some form of testimony

11:28:17

11:28:35

that this device is unique locations at a particular time are relevant to a criminal investigation, I really need to be able to say are they unique or are we seeing the same thing every Thursday and it just so happens it aligned with a Thursday. So that would be one.

11:28:51

We have a best practice of not changing any of the names of the files. When you upload the records, we want the original records. We want you to review all of the data. We don't want you to simply look at a two hour period and come to a conclusion.

11:29:07

We have a number of best practices as it pertains to validating the mapping. If it's a very significant phone call, we want to make sure is there an actual cell site where the cell tower icon is at.

11:29:22

There is just a number of different investigative practices that over the years we've created the best practices to help ensure that, you know, we are not just uploading records and looking at a map, right. There is some intelligent verification and some methodologies that are really bringing out what the records truly represent.

11:29:40

Q. Can you tell me when you're talking about validation and checking to see if a cell site exists, what do you mean by that?

A. It's super easy. In Google Earth, you just zoom in to where we put the cell tower icon and can you see a cell

11:29:57

tower. We have had cases where cell towers have moved and maybe the phone provider didn't update it in time. Are we seeing, like I said before, time/distance issues where all of the sudden we find an anomaly in the network where it's showing a phone moving faster than humanly possible. There are little things like that that do occur, they do happen. We are dealing with a technology that is not a hundred percent reliable. We need to make sure that if there are errors in the records themselves or the way that the phone companies are maintaining these records, that we can identify those and we can speak to them.

Q. So is one of the reasons these errors, is that why you recommend people use multiple pictures as opposed to a static picture -- or I should say multiple maps as opposed to a static map?

A. I would say multiple layers within a map of data, if it's available. Sometimes these cases only allow for a very small subset of data to be used. But yes, where there is known different types of data, we want to look at all of that data together. We don't want to look at anything in a vacuum, just one piece of evidence by itself. How does it relate to others. And that's that corroboration piece that I was talking about earlier, and that is one of our best practices, is going through a process of data corroboration.

Q. There is a couple things I'm hearing you say, that you

want to use multiple layers, so you want to look at multiple -- if there's a call, if there's a text, if there's data, do you want to look at all of that?

A. We do. But what I'm speaking to more precisely is, let's say in this particular case, I have call detail records that just have cell sites and sectors, I have TDOA data that gives me a range from cell site, and I also have some Google data that gives me some very precise GPS and wifi locations. So to not look at those three data sources together wouldn't only be like a failure, it would just be sloppy police work. So yes, corroborating the fact that the device that's generating -- there's one device that's generating all three of those different reports, those three reports should probably line up with each other, and if they don't, we need to know (A) that they don't, and why. It does happen. I've had cases where time zones have been inaccurately reflected, so we find all of the sudden a Google data is not tracking with the Verizon data, but then come to find out, it was off by two hours, because of a time zone issue. And when we synced up that time zone, everything aligned perfectly fine.

So, yeah, if you have multiple data sources, we absolutely need to layer those data sources on a single map and see how they correlate with each other.

Q. And do you also want to look at sort of a progression

of cell tower hits?
A. If they are available, we absolutely do. I don't want to just, like I said before, look at a single cell site. If I can see that a device is clearly moving east to west and
11:33:10 then it stops and then it moves back to the west, that's things we want to see that could be relevant to the case.
Q. Let's take a look at a couple of the government exhibits. Let's look at Government 25I -- or let's look at 25H since we have already seen that one. I believe you have
11:33:38 that in front of you, Government's Exhibit.
A. I do.
Q. Okay. Is this a TRAX produced document?
A. It's a screen shot of the mapping produced by TRAX. It's been somewhat edited, because there's been things
11:34:01 added, so for example, Daniel Errico that phone number with Verizon is not a TRAX product, and obviously the evidence label at the bottom corner. The horizontal plane, the green shape is generated in TRAX as well as that balloon that you see to the right of it is what we call our call balloon,
11:34:19 that's also something that's generated in TRAX.
Q. Now, generated in TRAX. But is this call balloon specific to this horizontal plane?
A. It appears to be. I didn't create this exhibit, so I couldn't tell you if it is or isn't just based on what
11:34:39 you're showing me here in front of me, but I have no reason

to believe it isn't.
Q. Typically when a TRAX call balloon is created and pulled up within TRAX, there is sort of a triangular arrow almost off of it pointing to the horizontal plane that it's
11:34:58 connected with, right?
A. Yes. I think what you're seeing here is somebody took a screen shot with the green horizontal plane and somebody took a separate screen shot of the center part of our call balloon and then put the two together. I can't speak to
11:35:12 exactly how that was done, I didn't do it. But like I said, it appears to be the call balloon that was associated with this call. You would have to speak to whoever actually created this exhibit.
Q. You are saying it appears to be, because you're
11:35:26 assuming they are connected, correct?
A. Saying it appears to be, because they are put on a single screen shot here. Now, if you're asking me is it possible that somebody basically duped this exhibit by pulling a call balloon from one call in a horizontal plane
11:35:47 from another call and put them together, of course, that's always possible, but there is just no way, based on what you're showing me right now I can testify that is the case or isn't the case.
Q. Now, the --
11:35:58 A. I can -- I can tell you that I've actually looked at

this specific call in Google Earth and what I'm seeing on the screen matches what the original KMZ, looks like. That's why I'm assuming, that's -- that this is the same one.

11:36:14 Q. You verified this data by looking at the Google Earth file?

A. I have looked at the Google Earth file and I have seen these calls that are in these exhibits in Google Earth as well. Now, if you ask me to bring them up side by side and

11:36:31 report anything that could potentially be a little bit of a discrepancy between the two, there is nothing that has caught my eye. I mean we can always do that manually and look, but it appears to be the same to me.

Q. Now, above that there is a box with a name Daniel

11:36:46 Errico and a phone number?

A. Correct.

Q. It's not your best practice to associate a name with a phone number, correct?

A. It depends. Typically no, but the only reason I say no

11:37:03 is for court purposes. I don't know what has happened on this case, maybe there is already a stipulation in the record that all of the parties have agreed that Daniel's phone number is this 8355 number for Verizon, and it's not being challenged. And for the efficiency of the jury, it

11:37:20 just makes sense to assign a name to a phone number.

Now, when I first create work product like this, obviously those type of stipulations haven't occurred, so as a best practice, I don't use names when I initially create work product, not because it's not a best practice, but because I don't want to redo the damn thing once all of the parties fight over the fact that I can't say that's Daniel's phone. So it really depends on your particular case. Like I said, if there's a stipulation that's already on the record that, hey, this is Daniel's phone and that's really not in question, then it makes sense to put a name to it. It's a little bit easier for everybody in the courtroom to follow the name Daniel as opposed to just a phone number.

Q. Now, when you're looking at an individual shot like this, alone you can't tell if it's an anomaly, right?

A. Yes. This is definitely a work product that would be generated for a very specific purpose or to illustrate a very specific time period and something specific to that. This is not something, you know, that I can just hand somebody and start talking about accuracies or what other things that come into play there, there is just more to it.

Q. Now, as far as the horizontal plane goes, it's an estimate, right?

A. It is an estimate, 100 percent.

Q. So you can't say with certainty that someone is -- that a phone was within that horizontal plane when a call was

made?
A. That is correct.
Q. And there is no -- Can you tell me where within the horizontal plane a call was made?
11:39:15 A. Not with what you're presenting me here. That's why we give you just that shape as a general estimation. Now, depending on other information, if we were to overlay the RTT data for this call, if there is RTT data, yes, I could probably get a little bit more accurate. If we were to then
11:39:35 overlay the Google data, I could probably get a little more accurate. But with just this information right here, the testimony would be limited to, we believe based on our testing of our system, there is a 95 percent probability that this device was inside the green shaded area at the
11:39:51 time of this connection on 8/20, at 6:33 p.m.
Q. And TRAX, this is specific to a voice call, but TRAX also produces these same horizontal planes with respect to text messages, right?
A. Text messages and data connections.
11:40:18 Q. And does the same accuracy relate to the horizontal planes produced by those methods?
A. We use the same sizing. Where I would change part of this is when we get into data, not so much text messages, but data, and it's the way the data is captured. You can
11:40:41 actually keep a data connection on a particular cell site

much longer than a voice connection, so data would start to kind of change. There's some reliability issues with data, but for voice and text, I would keep it the same.

Q. Now, you talked about the April, 2020, date as far as increasing reliability. Does that mean that the data from prior to that date is less reliable?

A. If the records hadn't been re-ran through our system, yes. The accuracy that we speak to -- or I keep saying about 95 percent throughout the country, that's going to drop to the mid 80s, maybe the higher 80 percentile, so yes, it would be less accurate if they weren't re-ran. Now, we could take these records and run them right now, we can run them last week, we can run them back in June, and all of those would have the updated database, so they would be more accurate.

Q. But looking at Government Exhibit 25H, can you tell when those records were run?

A. Not just looking at this particular exhibit by itself. I can tell you that given this case, I have looked at when the records associated with this case were ran, and they have been run since the update. They were run prior to it, but they were also ran after that update as well.

Q. Can you tell me, if you know, whether or not any drive testing has been done in the Grand Rapids area?

A. I know that our drive test scanner has been in the

Grand Rapids area a handful of times. As far as specifically which cell sites within Grand Rapids, I don't have that in front of me.

Q. Do you recommend that when people -- when investigators are investigating a case with your software that they also use drive testing?

A. It depends. The cavalier answer would be well, of course, we do, but there are always variabilities, right. Maybe I have a lot of TDOA type data. There is no reason to drive test if I have TDOA, because I'm getting essentially a type of drive test data from the carrier at the time of the crime from the actual network we are looking at. It's more reliable. Maybe I've got a case that's three years old and now, you know, it's a cold case and they just realized, hey, here's what we have. And what we are taking some chances here, should we drive test three years after an incident? It's hard to say. There is some times where I would recommend it, there's other times where it's clearly going to provide some false results because the network has changed in that three year period. So it really depends on the ability of both the agency to be able to do that, but also how it applies to the records themselves. We are starting to see more TDOA and other type of location data that is simply more accurate than what we are looking at on the screen here, and in those cases there just isn't a need

for a drive test.

Q. We talked -- Well, you talked a little bit about RTT data. How many data points do you need as a best practice when you're looking at RTT data?

11:44:17 A. It depends. I have had RTT cases where we had one cell site, one sector, and we have been able to recover the buried body. We didn't have very many data points at all, but we were able to analyze what we did have. I've had other cases where, you know, we have had up to 8,000

11:44:36 connections a day and we could literally bread crumb every movement that the device made throughout the day. So I mean technically, depending on the environment, if I had one data point, I could potentially give you a location. Conversely, super populated downtown area, I may need five or six data

11:44:59 points to really get it dialed in.

Q. Can you tell me a little bit about your educational background?

A. Sure. I have an Associate's Degree in public safety that I was required to get to promote. But short of that,

11:45:10 all of my other experience and education has been directly related to this field.

Unfortunately, there is no college degree that I can go out and get that specializes me to do what I do at ZetX or now for LexisNexis. So all of my education in this

11:45:28 field has been more of a direct hands-on or from the

manufacturers. So for example, when we work with Rhode Schwarz on drive test data, I'll travel to Germany and actually go through very specific training to those products, and radio frequency engineering that applies to this particular field. When I was doing a lot of stuff with cell site simulators, I received training from both a company called DRT and Boeing that would provide very specific enhanced training as it relates to radio frequency engineering, and as far as how these different signals work, how we are able to track them, how we can interpret them, how we can map them. So most of my training to that has been very specific to working with an actual manufacturer.

Q. So during direct testimony, you talked about your TRAX's or ZetX's cell tower database?

A. Correct.

Q. And that's comprised of information from a couple different sources, right?

A. Well, it depends on what type of information that data base you're referring to. If you're referring to specifically cell site locations, latitude and longitude of where the cell sites are located and the configuration of that cell site, how many sectors it has, and what direction those sectors face, that is made up 100 percent of data from the cell phone companies. It's the actual cell tower list we receive from the he cell phone companies. If you're

referring to the estimated range of hand-offs, that would be data that we come up with, with that algorithm that I described earlier.

Q. And that's based partly on your own drive test data?

11:47:06 A. Drive test data that, yes, I have personally done, but also drive test data that we've collected throughout the field that's been done by a number of different entities.

MR. TILTON: Thank you, your Honor.

THE COURT: Miss Sanford.

11:47:22 MS. SANFORD: Very briefly.

REDIRECT EXAMINATION

BY MS. SANFORD:

Q. Mr. Tilton talked to you about a paper by someone at Cherry Biometrics, and you mentioned that one of the

11:47:34 problems with their conclusions is that expert will testify that every tower has a range of approximately 30 miles or coverage area of about 30 miles; is that right?

A. Yes, it's either 31.6 or 31.2, I can't remember what his perfect number is, but yes, somewhere in that range.

11:47:54 Q. You said the problem with that is that every cell site is not the same?

A. That is correct.

Q. And part of what might affect the range is what type of tower it is?

11:48:07 A. Correct. And that's why a lot of times I'm actually

trying to break bad habits of referring to cell towers and refer to them cell sites. It could be an antenna that's in an airport, a shopping mall, a hospital, it could be a very small node that's actually attached to a street light. It could be something that's mounted on the side of a building. We see a number of different formats of cell sites in today's world.

Q. And the type of cell site is something that TRAX considers in its algorithm in determining a hand-off area?

A. It does. And that's why it's important we can't look at cell sites by themselves or just one or two of the neighbors. We have to look at the entire environment, and if you remember what I was saying our algorithm actually looks at this cone for up to 60 miles, we look at what that environment looks like for a 60 mile radius essentially of that cell site. That gives us the ability to see these little pockets of density. An example of why this could be so important is a college campus. On the edge of college campus, I could have a cell site that's pointing right in the middle of that campus that maybe covers 300 to 500 meters maybe. On the other side of that cell site I could have a sector that is pointed into the general community that could easily cover three miles. We see this on a daily basis, and it's really important for the investigative forensic side of this that we recognize that just because

these antennas are very close to each other on the same mass, does not mean that they interact the same. We can't go into the Court and represent these as all the same.

Q. So when you're considering the type of cell site, are you considering that only for that cell site to which the device is connected or for all the cell sites that are in the vicinity of where that device is?

A. We look at all of the cell sites. I commonly will refer to the fact that what cell sites my device isn't connecting to is just as important as the one that it is connected to. A lot of times we can really define an area because of the cell sites the device didn't connect to. So we have to look at all of those. And we actually have a tool in our mapping, and we call it our cell tower map, that I can enter latitude and longitude and it will actually map every cell site within a 20 mile radius of that point. And the whole reason we have created this tool is to give the ability to represent and see what those environments look like. In this particular case, I have ran one of those for Grand Rapids, and so I have seen what the cell tower density looks like and compared that to our ranging, and everything that I am seeing is exactly what we typically strive for. I'm not seeing any concerns or issues that I have with that ranging.

MS. SANFORD: I have no further questions. Thank

you.

THE COURT: Mr. Tilton.

MR. TILTON: Briefly.

RECROSS EXAMINATION

BY MR. TILTON:

Q. When did you do the cell tower density mapping?

A. For Grand Rapids specifically I've done it probably at least a dozen times. I did it specifically for this case about, I don't know, maybe two or three weeks ago, I ran another one yesterday preparing for my testimony today. But I've also worked on a number of other investigations in the Grand Rapids area that has required me to actually look at cell mapping.

We have got a case in the Grand Rapids area where we recovered a deceased individual based on mapping, and I needed to look at what the cell site density for that area is, and that's a case that's commonly used or covered in many of our training classes. So when I say I've ran it a couple of times, I've either seen that case presented or I've presented that case myself at least a dozen times, so I'm actually pretty familiar with that environment.

Q. When you run a cell tower density test, are you running it on the day that -- is it a present time test or can you run it for certain dates in the past?

A. Our system allows you to actually pick the date that

you want to run it for, and it will actually represent it for that particular date. The cell tower map will always default to just today's date when I run it, but we do have the ability to go in and run it a specific time period.

11:52:31 Q. What day did you run -- What date was the cell tower density test run for?

A. The one I ran yesterday I ran with yesterday's date, because I'm also looking at what our mapping looks like today on that as well as what it would have looked like in

11:52:50 2019.

As far as those other cases that I was referring to, I would say I've seen those over the last 18 months with different time periods in there, so I would say 2020, 2021. I could go back and look. I can actually look and see if I

11:53:05 ran one from 2019 or not. I can't tell you for sure if I have, but that's something we could actually look at.

MR. TILTON: Thank you.

MS. SANFORD: No further questions.

THE COURT: All right. Thank you.

11:53:18 Can the witness be excused for today?

MR. TILTON: Yes, your Honor.

MS. SANFORD: No objection.

THE COURT: Mr. Ray, you're excused with the Court's thanks.

11:53:25 THE WITNESS: Thank you.

THE COURT: Ms. Sanford, where do we go from here?

MR. McGRAW: We have one additional witness, your Honor.

THE COURT: Okay. Why don't we take -- we will take 15 minutes, we will resume at five after 12:00. I have a plea at 1:30, so factor that into your schedule.

Thanks.

COURT CLERK: All rise, please.

(At 11:53 a.m., recess.)

(At 12:12 p.m., proceedings continued.)

THE COURT: We are back on the record in 20-24. Counsel and the defendant are present.

The government may call its next witness.

MR. McGRAW: Thank you, your Honor.

The government calls Thomas Heikkila.

THE COURT: Officer, please step forward and be sworn.

THOMAS HEIKKILA,

was thereupon called as a witness herein, and after having been first duly sworn to tell the truth, the whole truth and nothing but the truth, was examined and testified as follows:

COURT CLERK: State your full name and spell you last name for the record, please.

THE WITNESS: Thomas William Heikkila, Jr. Last

name is H-e-i-k-k-i-l-a.

DIRECT EXAMINATION

BY MR. McGRAW:

Q. Good afternoon, Detective.

12:13:06 A. Hello.

Q. You are a detective with the Grand Rapids Police Department; is that right?

A. Yes.

Q. How long have you worked for GRPD?

12:13:14 A. Twenty-three years.

Q. What is your current role?

A. Currently I'm working in the Detective Unit of the Major Case Team, and I'm assigned to the Digital Intelligence Unit.

12:13:25 Q. How long have you been in that position?

A. I've been in that position full-time for the last three years part-time, I started doing it in 2016.

Q. Before we get into the details about your daily responsibilities, would you look at Government Exhibit 41 in

12:13:41 that binder in front of you. Do you recognize that document?

A. Correct, this is a my C.V. that I provided.

Q. And that's an updated version of it?

A. There is one training that is missing that took place

12:14:04 end of May to June of this year.

Q. We will get to that in a second.

MR. McGRAW: I would move to admit Government Exhibit 41, please.

MR. TILTON: No objection.

12:14:10 THE COURT: Received.

MR. McGRAW: Thank you, your Honor.

BY MR. McGRAW:

Q. Let's talk about, Detective Heikkila, your daily responsibilities. So you are in the Major -- I think you

12:14:19 said the Major Case Unit?

A. Correct. Major Case Team, it's a part of the detective unit that investigates homicides, robberies, serious assaults, weapons violations. And then within the Major Case Team is the Digital Intelligence Unit, that's kind of

12:14:36 who we are under, but we actually support the entire department, so it could be anybody -- any department in the Detective Unit or Traffic Unit, or even, you know, he I support our Vice Unit probably about 30 or 40 percent of the time.

12:14:50 Q. You've done that work full time since 2018?

A. That is correct.

Q. What kind of work do you do?

A. What we do is part of our Digital Intelligence Unit is we download and analyze cell phones that may contain

12:15:02 evidence. We also obtain and analyze records from cell

carrier providers, like AT&T, Verizon, Sprint, and T-Mobile. We also analyze social media records from companies such as Facebook, Google, Instagram, Snap Chat.

Q. I want to talk specifically about the call records that you'll receive or the phone records you'll receive from service providers like AT&T, Verizon, and Google. What specifically do you do, just in a general case, I mean, say, a homicide, for instance, when you get records from a phone company, what do you do with them?

A. So once the warrant has been served on the company, all of these companies provide the records back in a digital format, they come via email or via portal, at which point we would log into the portal and then I would obtain the records and download them to my computer. The records also come in a zipped format so they are zipped and compressed. So at that time, then I would take that zipped file, I would create another file with usually the incident number, a name if I know there's a name associated with the phone number, the phone number itself would be on the original folder, as well as who the records came from, be it AT&T, Sprint, Verizon. And then I put the original records still zipped in that folder. I would then zip that folder and upload it to the case file for the case itself. I would then go into ZetX, the software we use for mapping and analyzing call detail records, and once -- as we saw on the slide -- I

would type in again, you know, their first page is you type in the incident number, I pick a color I want to associate with the records, and then I type in the phone number.

Q. We will get into the details of how you use ZetX in a second. But fair to say you use call records or records from phone companies for historical location analysis on a daily basis?

A. Correct, on a daily basis.

Q. You've been doing that for three years?

A. Correct.

Q. And what specific training have you received regarding that type of investigation that you do, historical cell phone location analysis?

A. I have attended numerous trainings through PenLink is where I first started with call detail record analysis, and that was in 2016. So I initially started doing mapping with their software that they have, as well as analyticals and examining the call detail records and who is talking to who, and that was in 2016.

March of 2018, I attended ZetX, which was their basic investigations course, and that's when we made the move there to start using their software for the majority of our mapping. We still use PenLink for some of the analytical side of things, and they have a little more capability for other software we can ingest into their

software. And then I attended an additional training in November of 2018 with ZetX, and that training was to become a subject matter expert.

Q. What did that training involve?

12:18:24 A. So that training involved not only attending the 40-hour course, but then once we left there, we had one year to complete three assignments that they assigned to us as we went along. So they would assign us one case, we could -- we would complete paperwork on that, and what we saw in the

12:18:45 records, and then submit it to them, and they would provide us with a second case, and so on and so forth. So I had to complete three of those by November of 2019, which I did, and at that point, I became recognized by them as a subject matter expert and call detail record analysis and

12:19:03 geolocation data analysis.

Q. Using the ZetX software?

A. That is correct.

Q. And is that called TRAX?

A. That is correct.

12:19:11 Q. Have you had any refresher courses after that November, 2019, certification?

A. Correct. In January of 2020, I took a refresher course. That course was in Texas through ZetX. And again, this was, you know, refresher course because of technology

12:19:29 had changed. Some things that were happening back then was

Sprint and T-Mobile were going to merge, so there is a lot of talk about what platform they were going to use as far as providing us our records. We also knew that T-Mobile was starting to roll out some of the timing advance, TDOA or RTT for their network, so that was coming, and also we were talking about 5G and how some of these towers are now not going to be the traditional large cell towers that we were seeing, but going to be the cell towers on top of light posts, in airports, stuff like that.

12:20:07 Q. Any other trainings relevant to historical cell phone location analysis?

A. Correct. And then in November of 2020, last year, I attended WEXA, which is ZetX's Wireless Exploration or Exploitation Academy, it's kind of a conference. A lot of

12:20:25 case studies put on there from other detectives around the country with call detail record analysis that they have done and how it worked out. So that was in November of 2020. And I'm slated to return to that this year.

Q. How many times -- or have you testified in court before

12:20:43 regarding the historical location of cell phones?

A. Yes, I have.

Q. Approximately how many times?

A. Five to six times, maybe a couple times in federal court, few times in state court.

12:20:53 Q. And have you ever been qualified as an opinion or

expert witness in the field?
A. Yes, one time in state court.
Q. Now, were you involved in the investigation involving Mustafa Reynolds?
12:21:05 A. Yes, I was.
Q. What was your involvement?
A. My involvement was downloading and analyzing cell phones that were recovered on the incident, as well as analyzing call detail records and social media records that
12:21:18 had been obtained from providers on the case.
Q. Did you create trial exhibits for this case?
A. Yes, I did.
Q. What kind?
A. I created some, I believe, some excel spreadsheets, I
12:21:29 created a video, I created some screen shots of the video that was produced.
Q. When you're referencing the videos, that's Government Exhibit 25?
A. That is correct.
12:21:40 Q. And I want to focus on that. Is that the location map exhibit that you created for trial?
A. 25A, is that what you are talking?
Q. Exhibit 25 is the video, and then I believe you referenced screen shots that were taken of that video; is
12:22:01 that right?

A. That is correct.
Q. Okay. So 25 is the video, and 25A through 25S are screen shots of that video; is that correct?
A. That is correct.
12:22:13 Q. Okay. And are those screen shots accurate reflections of the video that you created?
A. Yes.
Q. Okay. I want to generally talk about this video that you created. What data -- underlying data did you rely on
12:22:31 to create this video?
A. The underlying data is the original call detail records that are obtained from the providers for each of the numbers and/or the gmail address that we obtained.
Q. What were the providers in this case?
12:22:45 A. The providers are Verizon -- Verizon call detail records, AT&T call detail records, and then what we have is Google location data.
Q. And do you remember the time period for which you obtained these records?
12:23:01 A. Correct. I believe around June -- started June of 2019 through -- some run up to the 21st, 22nd of August, and others run past that to 27th, 28th of August, depending on the individual.
Q. Fair to say approximately 90 days of data?
12:23:20 A. Correct.

Q. Now, let's discuss the different types of data that you'll receive from these service providers. So first, starting with Google. What type of information did you receive in this case from Google?

12:23:34 A. Google provided us with location data related to the device that belonged to allenjfmcallister@Google.com.

Q. What is that data?

A. That's location data that could be obtained from a cell wifi or even a GPS data hit.

12:23:56 Q. So wifi being wireless internet routers, could you explain that a little bit?

A. Correct. Cell being a cell tower, that's going to be our least accurate type of data. Wifi being a wifi router that they have associated a location with through a SSID or

12:24:13 Mac address, and that's going to be more accurate than cell. And then GPS data is what we think of as your turn-by-turn directions if you were to be -- have your map open on your phone, and it's going to tell you turn right, turn left, that is the data that Google is capturing on that.

12:24:32 Q. How about from AT&T and Verizon, what did you receive from them?

A. Again AT&T and Verizon provide with us the call detail records, specifically locations related with the call detail records. For Verizon, they also have what is called RTT

12:24:48 data for Verizon which is round trip time or as Mr. Ray

testified, TDOA, Timing Delivery On Advance, and they also provide, depending on when you can serve the search warrant, sometimes you can get text message content from Verizon or picture content. They also provide you with IP or data sessions that they have for where a device connected. AT&T provides voice, data, and text messages, as far as their data.

The difference between AT&T is they are the only provider that captures location data when a text message is sent. Verizon does not capture that data, neither does Sprint, neither does T-Mobile. So AT&T captures location data for a phone call as well as a text message that's sent, and then they also have an equivalent to RTT, which is NELOS data, but on this case, we didn't -- we weren't provided with any NELOS data.

Q. You've referenced RTT, can you just explain briefly what that is?

A. So RTT is -- it's technology that Verizon uses to locate a phone that is actively on its network. A phone, even when it's not making a phone call and it's idle, it's constantly reaching out to a tower so that when a text message or a phone call comes in, it can be routed -- or a phone call comes in, it can be routed through the correct tower, and Verizon logs these connections. So we get the time that the connection took place, the tower that the

phone connected to, the direction off the tower or sector, and it also provides us with how far away a distance that the device is from that tower. And that we are able to plot that on a map and it looks like an arc if it's off -- for 12:26:58 example, if it was off Sector 3, it's going to look like a straight out line for the azimuth and then an arc of about 120 degrees for the sector 60 degrees from either side of the azimuth on how far the device is from the tower.

Q. Do you know how long Verizon maintains this RTT data in 12:27:17 their system?

A. Seven days or less.

Q. Why is it so short?

A. Because it's an immense amount of data that they don't want to hold onto for long periods of time and store it.

12:27:26 Q. Were you able to obtain RTT data in this case?

A. Yes, I was.

Q. Which phone number were you able to obtain that RTT data?

A. I obtained RTT data for Mr. Reynolds' phone number, the 12:27:38 5055, Mr. McAllister's 8845, and Mr. Errico the 8355 numbers, all Verizon.

Q. Have you participated in any other investigations where RTT data was used?

A. I have, investigations and also trainings.

12:27:55 Q. And was that successfully used in those investigations?

A. Yes, it was.
Q. Would you just briefly describe what investigation you are referencing?
A. One of the cases involved an individual who was murdered in our city. We obtained RTT data pertaining to his device. That device then showed it traveling out to the west side of the city, and as you -- as we followed the data, we were able to find a spot of interest that we wanted to go out and check. I wasn't the one that went out there, my colleague is the one that did all the work, him and another analyst went out there and they actually located the body.
Q. Is that the case that Mr. Ray was referencing during his testimony?
A. That is correct. That case was actually referenced in January of 2020 when I was at their training -- or 2019.
Q. Now, once you have all of the data back from the providers, describe your process or methodology that you use with TRAX?
A. So once I have all of the data back, I look at each individual phone or gmail that I have, so I'll open up the time line slider is a slider that's up the corner on Google Earth, so I'll try to open about 10 or 12 hours and then I'll just let it play and kind of zoom out and watch it from afar to see if I see anything abnormal.

Q. Is there a reason you're doing that?
A. Yeah, I just want to make sure there is no anomalies with the data or, you know, do I got a person here that's routinely flying from Michigan maybe over to California or
12:29:36 tripping to Detroit a lot, just kind of get an idea what I'm going to be looking at, or is this an individual that stays central to the Grand Rapids metro area.
Q. Did you do that in this case?
A. Yes, I did.
12:29:47 Q. Did you note any anomalies?
A. I did not.
Q. So what do you do next?
A. The next thing I do is start to focus on the incident itself and then highlight conversations that are taking
12:29:59 place between the individuals involved.
Q. Fair to say you're looking at a specific date, time range?
A. Correct. Usually I try to focus on about 12 hours of the day. So if the incident I believe ends at, for example,
12:30:12 say, 3:00 in the morning on one day, I'm going to go all the way back to 3:00 a.m., or 3:00 p.m. on the next day.
Q. Do you do anything to change or alter the underlying data that you receive from the companies?
A. No.
12:30:27 Q. What is it that you do with that data in the TRAX

software program?
A. Then the TRAX software once it's uploaded, it produces the KMZ file then that I upload into Google Earth, and that's where we come out with the hand-off areas with those shapes, as well as then you end up with the Google location data with the radius attached to that location.
Q. Now, you may have heard during the cross examination of Mr. Ray, discussion of missing cell site towers. Did you hear that?
12:31:03 A. I did.
Q. And was that a factor -- were there any missing cell site towers that you saw in this investigation?
A. No, there were not. From the email I saw up there, that listed IP sessions for a Verizon phone. And again, I
12:31:19 don't consider IP sessions or locations in this case, or for that matter, in any case. I would consider it maybe for investigative purposes, but as far as coming into court and testifying to it without any additional corroborative data along with it or information, you know, be it maybe video
12:31:40 surveillance or something else, I wouldn't really testify to that, so I wasn't concerned about, you know, the IP sessions. I'm more focused on the cell site locations and any locations provided for calls or texts.
Q. You also heard Mr. Ray discuss the best practices that
12:31:59 they recommend users use?

A. Correct.
Q. And did you employ those best practices in your analysis of the data in this case?
A. Yes, I did.
12:32:06 Q. Specifically, I believe data corroboration was discussed. Do you remember that?
A. That is correct.
Q. Did you corroborate the data that you saw in this case during your analysis?
12:32:18 A. Right. I would corroborate the data from comparing the RTT data that I obtained on phone numbers with the call detail records and their locations on stuff. I would also corroborate the Google locations with, you know, what I knew cell phones, call locations were, and also an individual who
12:32:40 would have RTT data associated with their phone and a Google location that was within seconds of the RTT data that I corroborated with it. Also corroborated a lot of the evidence with bank statements, or corroborated it with, you know, receipts from stores. Ideally I would love to have it
12:33:01 corroborated with video evidence, but sometimes that's not always the case.
Q. I believe you testified that you created a video that we have marked as Government Exhibit 25 for trial; is that right?
12:33:12 A. Correct.

Q. You've discussed kind of how you've used the TRAX software up to that point. Now, how did you create that video using those KMZ files from the TRAX software?

A. Once I have all of the KMZ files and I have them loaded into Google Earth, now I start to establish locations and views for when I'm going to show a call, for example, that happens between Mr. Dame and Mr. Errico. I'm going to want to set that view out from a distance where I can portray it in a video where both calls show up. I might add an address maybe for where Mr. Errico lives, and maybe an address for where Mr. Dame lives. So once I have all of these placements set up in Google Earth, then I use another software that's called Camtasia, that gives me the ability navigate through the locations and the calls that I have that are relevant to the case, and also make a video of the screen.

Q. And again, throughout that whole process, are you doing anything to manipulate or change the underlying data that you received from the service providers?

A. No, I am not.

Q. You also took screen shots or have reviewed screen shots of that video; is that right?

A. That is correct.

Q. So and that's what has been marked as Government Exhibits 25A through S in front of you?

A. Correct.
Q. Are those accurate screen shots of the video that you created in this case?
A. Yes, they are.
12:34:42 MR. McGRAW: Your Honor, for purposes of the record, I would move in Government Exhibits 25A through S?
THE COURT: Any objection?
MR. TILTON: No objection.
THE COURT: Received.
12:34:47 BY MR. McGRAW:
Q. I would like to walk through a few of those screen shots with you at this time, Detective Heikkila. Let's start with Government Exhibit 25A. What do you see in this exhibit?
12:35:04 A. So this is the beginning of the video that I created. So what I would do is kind of type out in word form, so for example, Allen Mcallister here is in yellow, and his phone number listed as 88, I believe, 45 number and it says Verizon. So this is just to show that any call that pops up
12:35:29 in the color yellow, with the color overlay yellow, is going to be Mr. Mcallister, and corresponding, Mr. Reynolds would be red, Mr. Errico would be green. A Google location for Mr. Mcallister would be orange, and calls and/or text messages for Brett Dame would be blue.
12:35:49 Q. This is almost like a key for a title page?

A. Right. It's just a key, just to, you know, kind of show exactly how it plays out to keep everybody on the same page.

Q. You've attributed phone numbers to relevant individuals in this case; is that right?

A. That is correct.

Q. And generally speaking, how did you do that? Where did you get that information?

A. Again, from downloading the cell phones I obtained on the case, so I know that, you know, one of the phones was recovered with Mr. Mcallister, that is the phone number that was associated with his device. And looking at his device and examining the download that I did, and I know from experience that, you know, he had an Android cell phone, in order for you to have an Android, you have to have a gmail attached to it, and I know that gmail collects all of the data, so I submitted, you know, this was the gmail address associated with that phone. And again, another phone was obtained by Brett Dame, this is the phone number associated with his device. And then you have Mr. Errico's phone number and the phone that was associated with him. And then from the rest of the investigation, I was able to identify the phone number they were communicating with Mr. Mustafa Reynolds on is the 204-5055, which was later obtained from his person.

Q. Just to be clear, this isn't something that comes out of TRAX; is that right?
A. No, this is not.
Q. This is something that you've created based on your analysis of the data through TRAX; is that right?
A. That is correct.
Q. So let's go on to 25B.

If you could just walk me through how you created this portion of the video and why you chose to include certain things, like for instance, the gmail account and then the two call-out boxes?

A. Okay. So this is just showing the gmail account is the one we had associated with Mr. Mcallister's device, and then as you see, the address there of 731 Kellogg, from the investigation, I know that's where he resided. You see the orange dots, those are the locations that Google had obtained. So from analyzing the records, what I did with the call-out boxes are is you have 8/20/2019 at 12:37 and then the call-out box to the right is 8/20 at 15:58 hours. This is where that device was during that time period.
Q. So from approximately 12:30 in the afternoon on August 20th to approximately, what is that, 4:00 o'clock -- little before 4:00 o'clock in the afternoon, your testimony would be that based on the Google data, that device remained at 731 Kellogg Street?

A. That is correct.
Q. Did you create those two call-out boxes or call balloons, I think is what Mr. Ray called them?
A. Those are created in the TRAX software, so if we ran Google Earth, I could click on one of the locations for 731 Kellogg and it would produce this call-out box. What I typically do then is for the calls I snip out the call-out boxes because then once I then have the video that I'm producing with Camtasia, it gives me the ability to place the call-out box in an area where I can also drop other stuff in that makes it viewable. And that's basically what I did here.
Q. Did you do anything to manipulate the data that's contained in those call-out boxes?
A. No, I did not.
Q. And I see the source here is wifi. Can you explain what that means?
A. That is correct. So the location data that Google obtained, they got it from a wifi source. The device I.D. is the device I.D. that they have associated with the gmail address belonging to Mr. Mcallister. The lat and the longitude is the actual location that they obtained, and the radius is 14 meters or the level of confidence where they believe the device is located.
Q. If we could move on to 25C. Is this a similar data

point at a different point in time?
A. Correct. This is Google location data obtained from Mr. Mcallister on 8/20/2019 at 16:05 hours, it's a wifi source, it's got the same device I.D., the latitude and
12:40:22 longitude is the location with the 35 meter radius of confidence. And the address I have listed and identified on the map here is 1540 Wealthy Street, SE, which is a PNC bank.
Q. Before I ask you about that address, I notice the
12:40:38 orange dot is larger in this screen shot than it was in the previous one, why is that?
A. Again, that would be data that was obtained by Google and the level of confidence that they assign to that location.
12:40:51 Q. So it's just approximately 35 meters is their area of confidence for where that device was located?
A. Correct.
Q. Did you get other records or other information throughout the investigation to corroborate this data point?
12:41:08 A. I did. We had bank statements for Mr. Mcallister.
Q. And did that show that he made a withdrawal from that ATM around that date and time?
A. Yes, it did.
Q. If we could move on to Government Exhibit 25D.
12:41:25 This looks completely different. What are we

seeing in this screen shot?
A. These are records obtained from Verizon for Mr. Reynolds' 5055 number. This is RTT data that Verizon provided to us for the records that we requested.
12:41:45 Q. So explain each call-out box in this screen shot and then the subsequent arcs that are also displayed on the screen.
A. What we have here is RTT data provided from Verizon indicated that on 8/20 for the left box 2019, at 16:17 and
12:42:06 01 seconds, the device hit off tower 228501, and this would be, if you look at the arcs, it's going to be the one that's shooting straight west, so it's going to be the tower there right by the highway.
Q. This one?
12:42:24 A. That is correct.
So that's that tower. It indicated for a duration of 10.81 seconds. The device was off of Sector 3, and it was 1.36 miles away from the tower.
Q. And that's all data that you received from Verizon,
12:42:41 correct?
A. That is correct.
Q. What do you do -- or what does TRAX then do with that data?
A. They mapped it.
12:42:48 Q. Is that what we see in the arc on the lower part of the

screen?
A. That is correct.
Q. Why is it only that portion of the arc?
A. That's Sector 3. That's a hundred -- Sector 3, the
12:43:03 azimuth for Sector 3 is, I believe, it's 270 degrees, which
is straight out, so you're 60 degrees either side of that
azimuth for 120 degrees of coverage for Sector 3.
Q. If we only had that one data point, what would your
conclusion be about the device at that point in time?
12:43:19 A. My conclusion would be that the device could be located
very close to that arc anywhere along it.
Q. Anywhere along that arc?
A. Anywhere along that arc.
Q. But you had another data point; is that correct?
12:43:34 A. That is correct.
Q. From the RTT data?
A. That is correct.
Q. When in proximity to that first data point was the
second data point?
12:43:41 A. 57 seconds later.
Q. So that is what we see on the right side of the screen?
A. That is correct.
Q. Can you explain that data for us?
A. So, now at this point, Verizon has reached out to the
12:43:54 phone again, but it's off -- it's located on a difference

tower now, so that tower is identified as tower is identified as Tower 228178. That tower is actually on Sherrick, just north of Sweet, it sits on top of a water tower.

12:44:08 Q. That tower?

A. That is correct.

So when it goes out there and gets that, it comes back and the phone is 1.99 miles away along Sector 3. So Sector 3 would be 60 degrees either way of the azimuth from

12:44:27 the line up there by 3 Mile all the way down wrapping around the other tower now by Fuller.

Q. And the second data point, almost two miles away, the phone's further away from that tower than the first tower; is that right?

12:44:41 A. That is correct.

Q. So that explains why that arc is larger than the first arc?

A. Correct.

Q. What, if anything, now that you have this second data

12:44:51 point, would be your conclusion about where the device was located?

A. My conclusion is, is that based on now we have two hits, they are less than a minute apart, where those two cross, I would expect the device to be in very close

12:45:07 proximity to where they crossed.

Q. And in your experience, let's reference that homicide where you found the deceased individual, how many data -- RTT data points did you have in that case?
A. Multiple.
12:45:21 Q. Is two sufficient for you to be able to draw that conclusion?
A. Yes.
Q. If we could go to 25E. Is this just a zoomed-in screen shot of where those two arcs intersect?
12:45:37 A. That is correct.
Q. Did you add anything else to this portion of the video?
A. I did. I added Clancy and Fairbanks Street, NE, with a marker there showing where that location is.
Q. Why did you do that?
12:45:53 A. Again, that comes from the corroborating data that I obtained from the cell phones that I downloaded right around the time period when these RTT data points were crossing that there was conversations going on between Mr. Mcallister and Mr. Reynolds that talked about this location.
12:46:11 Q. For purposes of what? What were they discussing?
A. Where to meet up to buy some drugs.
Q. And was there any other data regarding this specific date and time that you used to corroborate that?
A. Yes, there was.
12:46:29 Q. If we look at 25F. What do we see in this screen shot?

A. So what we have here is this is Mr. Mcallister's Google location data, so we have again, two call-out boxes, the first one on the left lists 16:18:57 as the time, and the one on the right is 16:22:05, so these are locations that
12:46:57 Mr. Mcallister's device was located at this area.
Q. In the same proximity of the corner of Clancy and Fairbanks?
A. Yes.
Q. And isn't it approximately one minute after that first
12:47:12 RTT hit from -- that was displayed in Government Exhibit 25D?
A. Yes.
Q. Now, let's -- If we could skip ahead to 25H, which we have already seen and discussed today.
12:47:40 So this is a different type of underlying data that's being mapped here, correct?
A. That is correct.
Q. What is this?
A. This is call detail records up obtained from Mr.
12:47:54 Errico's Verizon records showing the hand-off -- estimated hand-off area for him for a phone call that took place on August 20th, 2019, at 18:33 hours. It was an outgoing call to the 5055 number, which is Mr. Reynolds. Duration of the call was eight seconds. 228501 is the tower there at Fuller
12:48:18 and Michigan. He is off the 3 Sector, the time zone is

Eastern.

Q. Now, I would like to look at the green overlay, which I think has been referred to as the horizontal plane. You're familiar with that term?

12:48:32 A. Yes, I am.

Q. What does that green area represent?

A. That represents the estimated hand-off area for the call that took place during this network transaction.

Q. So if you move, let's say you start at the tower, you

12:48:48 know, near Fuller and Michigan, and you move west or you move out towards the edge of that overlay, what would you expect to happen?

A. I would expect the further you get away from the tower and outside of the colored overlay, I would entirely expect

12:49:05 the phone to hand off to a different tower with a stronger signal.

Q. Did you review whether -- in the TRAX software -- whether there are other towers located in this area?

A. There are.

12:49:18 Q. And what, if anything, is your conclusion about where Mr. Errico's device was located based on this data?

A. Based on this data, I would say that he is located within the colored overlay or he could be outside of it.

Q. Now, it's possible that it could be outside that green

12:49:37 overlay; is that right?

A. That is correct.
Q. Is that because, again, this is an estimation of where the phone is located?
A. It's purely an estimation.
12:49:46 Q. Are you able to say with any certainty or specificity that it's at a specific location within that green overlay?
A. No, I am not.
Q. But your conclusion would be that it is somewhere inside or near that green overlay; is that correct?
12:50:01 A. That is correct.
Q. Do you know what factors might affect the shape or look of the green overlay?
A. Well, the factors that might affect are tower density, kind of where the tower is at, so the reason why this is a
12:50:23 larger tower or why the overlay is larger is based on the mapping that ZetX does by comparing the azimuth from the south sector with the other surrounding towers as well as tower density and drive test data that they've obtained and have in their cell site database along with the algorithm
12:50:46 that they run. If this same call takes place in an urban area, I would anticipate that the call hand-off area is going to be much less, because there is going to be more tower density, and that's why.
Q. You discussed -- you mentioned drive testing?
12:51:03 A. Correct.

Q. Have you ever performed drive testing?
A. I have not.
Q. Has anyone with GRPD done drive testing that you know of?
12:51:12 A. Yes, my colleague has done it a handful of times.
Q. Do you know when and where he did that?
A. In June of 2020, he did that on some streets on the southeast side of our town as well as along Plainfield Avenue and Michigan Avenue in the city.
12:51:31 Q. Why -- Is it possible to drive test for every one of your investigations?
A. No, it is not.
Q. Why not?
A. It is very time consuming, the equipment you have to
12:51:43 obtain it from Arizona; time consuming, and it's kind of a case-by-case basis. You look at all of the evidence that you have on a case and make the decision based on that.
There is only two people that work in our office that would be able to do it, and it's just not feasible for
12:51:59 us. In an ideal world, it would be great, but it's just not feasible.
Q. And lastly, if we could just flip to 25I. This looks very similar to 25H, just a different color. Can you explain what we are seeing here?
12:52:27 A. Correct. This is from Mustafa Reynolds' Verizon

records, call detail records, and it's 8/20 of 2019 at 18:33 hours. He has an incoming call from 5055 number, which is Mr. Errico, eight seconds of duration. Again, Towers 228501, Sector 3, in the Eastern time zone.

12:52:54 Q. Fair to say this is the same call that we saw in 25H, just the data that came from Mr. Reynolds' cell phone?

A. That is correct.

Q. Do you ever look into the frequency with which a particular device will connect to various cell towers?

12:53:13 A. Yes, I do.

Q. Why do you do that?

A. To identify -- Well, people are going to -- You are going to connect most likely two tours depending on what your lifestyle is like. You're going to connect to -- your

12:53:26 top tower is probably going to be where you live. Your second tower is probably going to be where you work, and if you don't -- if you're not married, maybe your third tower is your girlfriend or your boyfriend. So I always look to see what their top tower is, that is what we, based on

12:53:42 training and experience, would call their home tower.

Q. And did you do that for Mr. Reynolds' phone?

A. Yes, I did.

Q. Did you learn anything about that, I think it was 228501, the tower that we just saw on 25I?

12:53:55 A. Yes. Based on the 90 days of records that we ordered,

he hits off that tower 67 percent of the time.
Q. The tower and sector?
A. Tower and sector. That sector 100 percent of the time out of the 67. He never hits off any other sector on that tower.
Q. What does that indicate to you?
A. He is off Sector 3 for 100 percent of the time when he hits that tower.
Q. To the west?
A. To the west.
Q. And what about Mr. Errico's phone, did you look into the frequency with which he hit off of this tower?
A. Yes, it was very low. This isn't his home tower.
Q. To conclude, Detective Heikkila, once you've created all of these, you know, trial exhibits that you intend to use at trial, do you do anything to corroborate these data points and ensure the accuracy with the underlying data that you originally received in this case?
A. I do. So what I do is once the video is created and I'm ready to turn that over for, it's going to trial, it's going to be an exhibit, I go in and, for example, I'll -- we will use a 25I, and I look at here, it lists me the tower, and the sector where this phone call took place. So I'll actually go back into Mustafa Reynolds' original records that were provided me by Verizon, and they also provide the

tower list. The tower list is the Verizon towers for the area of the calls that took place in the records I ordered. It's an excel spreadsheet, so I'm able to go over to one of the rows, and I type in 228501, it brings up the number, I 12:55:54 find Sector 3, it lists the latitude and the longitude for the cell site. It will also provide me with the azimuth in degrees for the sector. So then I take the latitude and longitude, while I'm in Google Earth, before, you know, the video is going to be produced, and I punch in the latitude 12:56:16 and longitude, and it drops down right on the tower. And I know by looking at it that 270 degrees is the azimuth that it indicates. So I do that for the whole video, just to confirm that the locations that are produced by ZetX with the KMZ files match up to what I'm providing in the raw 12:56:42 records.

Q. You do that for every one of the data points that you use in your trial exhibits; is that correct?

A. Correct.

Q. Thank you.

12:56:49 THE COURT: Mr. Tilton.

CROSS EXAMINATION

BY MR. TILTON:

Q. Good afternoon, Detective Heikkila.

A. Hello.

12:57:05 Q. So let's go back to when you got involved in this case.

Can you tell me about that?

A. I got involved in this case maybe a week or so after the incident happened. I was -- came in contact with a detective on the case and he talked to me about some of the

12:57:34 evidence that they had and what we could obtain from it, and then the move that I made was downloading some of the cell phones and analyzing those records, and then serving out search warrants for call detail records, social media records on the case, that's my involvement.

12:57:50 Q. So just to break that up. First, you downloaded some phones that you already had?

A. Correct.

Q. And then you started drafting search warrant affidavits?

12:58:00 A. Correct.

Q. And I'm going to try to go through this pretty quickly, but we've heard a little bit about those devices, one was for Mr. Mcallister's gmail account?

A. Correct.

12:58:11 Q. One was for the phone that you identified as Mr. Reynolds' phone?

A. Correct.

Q. One was for Mr. Errico's phone?

A. Correct.

12:58:22 Q. One was for Mr. Dame's phone?

A. Correct.
Q. The last was for Mr. Mcallister's phone?
A. For his gmail or his phone -- phone and gmail.
Q. Total of five search warrants?
12:58:32 A. Yes.
Q. Did you draft those search warrants yourself or did you use TRAX for those?
A. I believe I did.
Q. Which one?
12:58:40 A. I believe I drafted them myself.
Q. And did you create your own reports when you were drafting those search warrants?
A. I don't -- I don't know if I did right offhand. I can't remember.
12:58:54 Q. Would that be your normal practice?
A. My normal practice would be to obtain information from the detective as well as what I knew from the phone downloads and then would draft the search warrants that way. That's typically what I do. If I had to write a report for
12:59:11 everything I did on every case, it would be a big report.
Q. So you draft -- you submit the search warrants, and then did you get the phone records and gmail records pretty quickly?
A. It all depends. Verizon provides records quickly. I
12:59:28 can't tell you the exact date when I got them back. AT&T

usually comes back quickly. Google not so much. I can't exactly remember when I received those records back, but the call detail records would come back usually fairly quickly.

Q. You received those in September of 2019?

12:59:44 A. That's probably right.

Q. And you mentioned that there is a couple categories of data within those call detail records?

A. Yep.

Q. Some is the tower information, the call information; is

12:59:58 that correct?

A. Correct.

Q. And then there was, you requested text message content?

A. Correct.

Q. Now, can you tell me what you did with that information

01:00:08 next?

A. Then that information is loaded into the ZetX TRAX software.

Q. That would include everything but the text message contents?

01:00:18 A. That included everything that comes in that zip file. I don't remove anything out of that.

Q. You just upload it all to ZetX?

A. Upload it all to ZetX. And then their software goes about processing information that contains location data

01:00:34 that we can map, and then we download the KMZ file. If it

doesn't include location data, then it produces a Linx report.

Q. You saw earlier one of the demonstrative exhibits we used with Mr. Ray showing an email receipt of everything that had been processed at one time through ZetX?

A. That is correct.

Q. Did you receive those emails?

A. Right offhand -- I've received emails like that before from ZetX. Right off hand, I don't know if I did on this case or not, I would have to look and see.

Q. But typically they send you those emails?

A. Typically we do, but typically I upload between 2019 and now, I've probably uploaded a hundred plus records to ZetX.

Q. Each time did you receive an email?

A. Probably.

Q. Now, ZetX could -- can process some of those records, but not all of them?

A. That is correct.

Q. So what do you do with the records that it can't process?

A. I look and see if they are going to be relevant to my investigation and go from there.

Q. Do you review like the text message content?

A. I looked at the text -- I don't believe we had any text

message content on this case because of the time. That's similar to RTT, you can't -- they are not going to retain text message content for a long time, so.

Q. You don't recall reviewing any in this case?

01:01:58 A. No.

Q. So now the information goes to ZetX and then you download it from there?

A. Correct.

Q. And you downloaded a number of Google Earth files or

01:02:11 KMZ files?

A. Correct.

Q. From each device?

A. Correct.

Q. And then the Google account as well?

01:02:16 A. Correct.

Q. Did you review every download that you received?

A. I did.

Q. So each one of the Google Earth files, you would have spent some time looking at?

01:02:27 A. Correct.

Q. And you mentioned the process in which you look at, sort of, I guess, cull down, all of those files to a relevant time period?

A. Correct.

01:02:40 Q. Can you tell me about that?

A. Once I review the data as a whole from June to August, and I don't see any anomalies or anything that is jumping out at me, then I began to focus on the date of the incident that we have and establish, probably I think I said like a 12-hour time frame from maybe the end of the incident to 12 hours before, so that's what I focus on.

Q. Can you tell me, let's start with the three month period, or the longer period. Can you tell me how you look for anomalies?

A. Well, I start to look at the data and I start to see all of the hits as it's going, and I want to look to see if all the sudden do I have one that's jumping all over the place. Like did it get a ton of hits that are happening in Grand Rapids and then all the sudden we get one hit in Kalamazoo or out in South Haven and then we are right back to Grand Rapids. It's typical stuff like that. For this case, I didn't see anything like that.

Q. So you didn't see any anomalies?

A. I did not.

Q. And then you looked at the 12-hour period?

A. Correct.

Q. Can you tell me what you did there?

A. Again, then I start to focus in on calls that are taking place between all of the individuals involved that are involved in the case, and then also knowing all of the

corroborative data that I have or corroborative information that I have for the case, you know, be it text messages that I have obtained from phone downloads, bank records, or receipts, and I want to match that up with the data that I've obtained from the providers to corroborate it.

Q. Let's step back before you look at sort of the information that's outside of these Google Earth files.

When you are looking at this 12-hour period, you know, let's use August 20th, 2019, is that the time period you're looking at?

A. Yes.

Q. And when you look at those Google Earth files, are you multi-layering like Mr. Ray talked about?

A. Initially, no. I start out not multi-layering because if I try to multi-layer all of the Google locations with three other call detail records and RTT, my computer is going to crash, and I have a very powerful computer, so I do it one at a time, and then on Google Earth I'm able to create a folder that I typically title the incident number, and when I see a call like, say, between Mr. Errico and Mr. Reynolds and it happens, you know, at 2:00 or 4:00 o'clock around when I've began, you know, the examination, then I move those two calls up over there, because that's what I'm going to want to highlight.

Q. Okay.

A. But to look at them all together, it is going to crash.
Q. It would be hard to look at all of those details?
A. That is correct.
Q. But if you start with one device, you can look at the
01:05:48 different sources of information from that device, right?
A. If I start with one device, then yeah, that's what I'm
kind of keying in on now that device and what information I
have that corroborates, you know, where it's going.
Q. And I mean by the multi-layering, you're looking at
01:06:10 voice, text, and data?
A. I'm looking at voice -- it depends on the records. I
don't ever consider data.
Q. What about text?
A. Verizon doesn't provide location data for text
01:06:21 messages, neither does Sprint, neither does T-Mobile. AT&T
is the only one that does. And I considered their location
data for Mr. Dame.
Q. You looked at his text messages?
A. His text messages that he was sent did provide location
01:06:32 data.
Q. From August 20th?
A. Correct. If it was a text message that was sent
typically between somebody involved in this incident. You
know, some phones are different than others, some have more
01:06:49 activity. If I were to map, say, Mr. Mustafa all the calls

his had, he might have a hundred compared to, you know, some of these guys only have seven or eight in 12 hours, that's going to be a long video with a bunch of conversations with people that are involved in the case.

01:07:04 Q. So you rely on that 12-hour review in making your final conclusions?

A. I rely on the review of all of the records, but the 12 hours is what I focus on, yes.

Q. Now, when you're looking for anomalies -- Let me back

01:07:19 up.

When you do this review and come to your conclusions, do you write a report?

A. I do not. The video is the report. The records are the report. That is the report.

01:07:42 Q. Do you document if you see any anomalies?

A. If I saw any anomalies, I would call it out and I would point it out at the beginning when I reviewed it at the -- for the full 90 days. So if I find an anomaly, then I'm going to take action to either re-serve the subpoena,

01:08:03 contact the provider to see why it's going on, or I'm going to look at the anomaly and find out what happened. But an anomaly is an anomaly; it happens, it happens.

Q. I'm just trying to find out where you would document it, if you would?

01:08:15 A. I document it with the video.

Q. So you would document any -- You would include any anomalies in your presentation video?
A. If I knew of any anomalies, I would address them. I didn't see any anomalies.
01:08:30 Q. Let's go back to Government Exhibit 25H. Can you see it? Does everyone have a copy? You have a copy of 25H?
A. I do, I'm looking at it.
Q. And just to refresh, what is this green ameba-like form called?
01:09:27 A. That is the estimated hand-off area for the phone call that took place on 8/20 at 2019, at 18:33 hours.
Q. That is the horizontal plane?
A. Correct.
Q. And do you believe that there was 95 percent chance
01:09:42 that Mr. Errico was in that horizontal plane when he made that call?
A. Based on when these records were run, they were run pre April 20th of 2020, so I believe he testified that they were 85 to high 89 with their accuracy on where the device would
01:10:04 be located in the estimated hand-off area.
Q. This is the original -- Is this the original record you ran back in 2019?
A. I believe it is.
Q. And because of that, that's why you believe there's
01:10:20 this lower accuracy rate?

A. Correct. You know, I could run them again and it could be different, because without knowing exactly, you know, when it was run, but I believe this to be when it was 2019, around the time when I got the records.

01:10:40 Q. So do you believe anything -- any TRAX reports that are produced with a horizontal plane have a 95 percent accuracy rate?

A. I do.

Q. And that would mean that the person -- excuse me, the

01:11:01 device, is -- there is a 95 percent chance that it's contained within that horizontal plane?

A. That is correct.

Q. And any reports, any TRAX reports produced prior to April, 2020, there would be less than a 90 percent accuracy

01:11:21 rate that the device was contained within the horizontal plane?

A. That is correct.

Q. Now, just based upon the TRAX software, you don't know where an individual would be located within that horizontal

01:11:41 plane?

A. I do not.

Q. They could be at any place within that shaded area?

A. Within the shaded area or outside of it. They could be outside of it.

01:11:52 Q. But there is a 95 percent chance they are somewhere in

it?
A. Well, for this one -- depending on when it's run, yes. But there is -- I would expect it to be inside of this. The further it got outside of the shaded area, including the
01:12:08 further away it is from the azimuth, I would fully anticipate that it would hand off to another tower with a stronger signal.
Q. So if this report was run prior to April, 2020, there is a five percent chance that the device is outside of the
01:12:28 horizontal plane?
A. Correct, prior to April --
Q. Excuse me, I keep getting those dates mixed up. Let me ask the question again.
If this report was run prior to April, 2020, there
01:12:43 is at least a 10 percent chance that the device is outside of this horizontal plane?
A. I believe he testified 85 high 90s, so 10 percent, 11 percent, yes.
Q. And if the report was produced after April, 2020, then
01:13:04 there is only a five percent chance that the device is outside of the horizontal plane?
A. That is correct.
Q. And that April, 2020, date doesn't have any bearing about determining where someone is located within that
01:13:22 horizontal plane?

A. No, it does not.
Q. And you mentioned that AT&T produces locations for text messages?
A. Correct.
01:13:36 Q. And TRAX produces the same type of horizontal plane for AT&T text messages?
A. That's correct.
Q. And the same levels of confidence apply to those text messages?
01:13:50 A. Correct.
Q. Now, when we are looking at Exhibit 25H, this exhibit is not something that was purely created by TRAX?
A. No, it was not.
Q. The horizontal plane was created and that map was
01:14:17 created at one time; is that right?
A. Correct.
Q. And then you would have highlighted so that the information bubble comes up?
A. Correct.
01:14:28 Q. And you cut and paste it?
A. Yes. I snip it, and then with the Camtasia software that I can use, it gives me the ability to move it anywhere on the screen. I can shrink the size of the snip and move it over to the left or keep it on the right, that's why I do
01:14:45 it that way, and then, you know, that's how you make the

video, and then I add in Mr. Errico's name along with the number.

Q. Now, we talked a little bit about RTT. I would like you to look at Defense Exhibit MM. Do you have a binder up there? Do you have it in front of you?

A. MM?

Q. MM, Verizon wireless.

A. Yes, I do.

Q. Do you recognize that?

A. I do.

Q. Can you tell me what it is?

A. It's the Verizon wireless RTT report and round trip delay disclaimer.

Q. Does that tool talk about high confidence factors and low confidence factors?

A. Yes, it does.

Q. And does it say that measurements are best estimates rather than precise locations?

A. Yes, it does. But if I read the whole thing it would probably help to explain.

Q. Sure.

A. When you get the RTT data, it provides the distance. Like I said, the distance from the tower that the device is off of the sector, and they map that by an arc. The additional information that the RTT data provides is the

latitude and longitude measurements on the real time tool are derived -- this is their explanation -- solely from round-trip delay measurement. They are best estimates and are not related to any GPS measurement.

01:16:49 If I were to also include the RTT lat and long, that display is almost like a Google location that you saw for Mr. Mcallister. This disclaimer says not to rely on it. We never rely on it. We use the direction that the device is off of the tower off of the sector were the arc. This is

01:17:14 what it's telling us is not -- these are best estimates, they are not related to any GPS measurement. Measurements with a high confidence factor may be more accurate than measurements with a low confidence factor, but all measurements contained on this report are best estimates

01:17:29 available rather than precise location. They are talking about the latitude and longitude measurements. The only latitude and longitude measurements I use that are related to RTT is the latitude and longitude for the tower. That's it. The tower is fixed.

01:17:49 MR. TILTON: Your Honor, I move to admit Defense Exhibits MM.

MR. McGRAW: No objection.

THE COURT: Received.

BY MR. TILTON:

01:17:54 Q. Okay. So when we look at Government Exhibit DD --

going to switch binders on you. The smaller binder. 25D.
A. B?
Q. D as in dog.
A. Okay.
01:18:12 Q. Do you have D up there?
A. Yep. D as in dog?
Q. Yes.
A. Yeah, I got it. Sorry, I couldn't hear.
Q. These are the arcs on your exhibit?
01:18:24 A. That is correct.
Q. Are you saying that these arcs are precise?
A. If I have one arc, I would testify that the device, just say one arc, say we don't have the other one, we have the one at 16:17, I would testify that I would expect the
01:18:41 device to be very close to the arc or slightly outside thereof. Because we have another arc that's 57 seconds from the first one, and it's off a completely different tower, now we have two arcs that cross. My testimony is that where they cross, I would expect the device to be in very close
01:19:03 proximity to that area. Nowhere on this exhibit do I consider the latitude and longitude that's provided with the records for these RTT hits. Never would I ever do that. We don't do that.
Q. What I'm asking you is: How precise do you consider
01:19:22 these arcs?

A. Well, I zoomed in -- yesterday I zoomed in on the arc and I did a measurement. The arc, when you get down close to it, is actually 25 meters. I would say the device could be anywhere from probably, you know, 25 meters either way of
01:19:40 that arc.
Q. It's down to you believe it's within 50 meters?
A. Within 70 meters of that arc.
Q. And what do you base that on?
A. Based on training. Experience. The other thing, they
01:19:57 have them where they cross, so I'm not exactly saying that where they cross, the X, it has to be there. I would say it would be in close proximity of there. Could it be -- You know, you draw a 70 meter circle, absolutely.
Q. Did you learn that 70 meter area from your training at
01:20:16 ZetX?
A. That -- That's kind of a conservative estimate. I think it's less than that. I think less than that, because I have -- we have the information from Mr. Mcallister's, we have one RTT hit for his device, and that gets corroborated
01:20:36 with a Google hit two seconds later that's maybe 10 meters off of the arc.
Q. I'm still not clear where you're coming up with the 70 meter figure?
A. That's an estimate that I'm saying based on -- that I
01:20:49 believe it is. It's not going to be, nothing is absolute

around this arc, so I'm saying it could be 70 meters either way of it.

Q. And that's just an estimate you're making based on these specific arcs?

01:21:00 A. Correct.

Q. Would it apply to other arcs?

A. Correct.

Q. Is it always 70 meters?

A. Could be less, could be more.

01:21:09 Q. You are not sure?

A. It could be less, it could be more. It depends.

Q. Now, you talked about looking at percentages of times that a phone hit a certain tower. How did you do that?

A. Again, that's -- those are part of the Linx reports

01:21:36 that's generated once the records are uploaded to TRAX. They give you -- There's Linx reports that you can go into -- I can identify, you know, top five contacts for a caller and then cell site frequency.

Q. So when we say Linx reports, we are talking about

01:21:53 reports that are created in ZetX?

A. Correct.

Q. Or TRAX?

A. Correct. They are created by -- once the records are uploaded, you can use PenLink to do it. I've done it that

01:22:05 way with their software, but ZetX does the same thing.

Q. When you come to your overall conclusions, are you relying on those reports that you're running?
A. No. No. I map the records, and then when I go back and look, I generate, you know, the consistency to see if it matches up with what I'm seeing, and it does.
Q. How many reports did you run in ZetX?
A. I think I ran, for this one, probably just the tower contact or site frequency for the tower.
Q. Once you run a report, do you download it?
A. Do I download the report?
Q. Yes.
A. Yeah, yeah, I would. I guess you have to download them to view them.
Q. Did you plot any -- Let's go back to Exhibit 25H.
Are you able to plot cell tower location by hand?
A. Yes, you can.
Q. I mean do you specifically have that skill?
A. No, I don't do that. That's time consuming. No.
Q. Let me back it up. Do you know how to do it?
A. Do I know how to do it?
Q. Yes.
A. I could figure it out, yes.
Q. Have you ever done it before?
A. In a case?
Q. Yes.

A. No.
Q. So, fair to say you never did it for any of the points in this case?
A. No.
01:24:10 MR. TILTON: May I have one moment, please, your Honor.
(Pause in proceedings.)
MR. TILTON: Nothing else, your Honor. Thank you.
THE COURT: Mr. McGraw.
01:24:23 MR. McGRAW: One, maybe two questions, your Honor. Thank you.

REDIRECT EXAMINATION

BY MR. McGRAW:
Q. Detective Heikkila, regarding that frequency report -- 01:24:30 the cell tower frequency report, are other softwares capable of doing the same thing? I think you mentioned PenLink as one example.
A. Yes, PenLink is, and you can do it yourself. You can do it manually. All of the records are searchable. AT&T 01:24:48 comes in a PDF, you can search that, and then the Verizon records come in excel, and you can search it that way.
Q. Sort or filter the excel data; is that right?
A. Yep.
Q. The way that it's originally produced by the service 01:25:02 providers?

A. Yes.
Q. Could get you the same outcome that you got running the report through TRAX?
A. There is going to be an error rate though. If you do
01:25:10 it yourself or map anything by hand or do it yourself, yeah.
Q. Certainly. I would imagine it would take quite a lot longer as well?
A. Probably take a few months.
Q. Thank you.
01:25:22 MR. TILTON: Just one really brief question.

RECROSS EXAMINATION

BY MR. TILTON:
Q. Outside of the reports that were produced by TRAX in your exhibits, you haven't created any written documents
01:25:38 about what you did with TRAX or your conclusions?
A. Correct.
MR. TILTON: Thank you.
THE COURT: Detective, you may step down, sir, with the Court's thanks.
01:25:49 (At 1:25 p.m., witness excused.)
THE COURT: Miss Sanford? Mr. McGraw?
MS. SANFORD: Your Honor, we think that the testimony that the Court has heard this morning and afternoon establishes that this method is valid and
01:26:04 reliable.

THE COURT: All right. Hold on. So you haven't got any more proofs?

MS. SANFORD: Oh, I'm sorry. No, we have no more proofs.

01:26:09 THE COURT: Okay. All right. Thank you.

Let me hear from Mr. Tilton. Go ahead, sir.

MR. TILTON: I do not have any proofs to offer, your Honor.

THE COURT: All right. So you are satisfied with

01:26:20 the record as it is now?

MR. TILTON: May I have one moment, please?

(Pause in proceedings.)

MR. TILTON: Your Honor, what I would just supplement to my argument earlier, couple points as far as

01:27:00 the record; one, is that had I been granted -- had we been granted a continuance, I have been in contact with Vladon Jovanovic, who is the expert whose affidavit referenced earlier, it was my intention to call him. He was traveling overseas until today, so we could not -- he wasn't available

01:27:22 today, but he would have reviewed the TRAX files. That is it as far as proofs, I mean I would have additional argument later on, but --

THE COURT: So you desire to inquire of that witness on the record for purposes of the record?

01:27:40 MR. TILTON: Yes.

THE COURT: That witness was unavailable today?

MR. TILTON: He was unavailable. It would require -- and he has not reviewed the KMZ files, he would need to review the KMZ files, so that would be part of that. But he is not available today.

01:27:56

THE COURT: But in any event, he is focused in on communicating with your office on this case?

MR. TILTON: Yes, your Honor.

THE COURT: Fair enough.

01:28:06

MR. TILTON: Yes.

THE COURT: Okay. He is coming back to the United States today?

MR. TILTON: He was going to be back in the United States today.

01:28:12

He did have specific opinions about the ZetX program and outside of the data for this file -- the government recently provided, so I could call him for sort of either purpose, but I would prefer to give him time to review everything.

01:28:37

THE COURT: Do you have any notion as to how long it would take him to review what he needs to review? Assuming he gave it A-number one, top flight priority, recognizing there is a trial date of August 23rd?

MR. TILTON: I mean he -- when I described the sort

01:29:01

of breadth of the data -- of the different data points, and

discussed it with him, he told me several days of review. Now, I don't know his calendar, if he is available to go, you know, full tilt on Monday, but I think he would make it a priority, I think.

01:29:19 THE COURT: Okay. Well, let's do this: Obviously this is an important issue and counsel wants to confer with the witness that has just been identified, so I'm not going to adjourn the case, at least as of right now, I'm not going to adjourn the case. And at the outside, we will take

01:29:44 additional proofs on this case on Monday, the 16th of August, in the morning. If I can schedule you the prior week, because a case is going to resolve, knock on wood, then we will do it sometime during the week of August the 9th. But I'll give you the 16th in the morning for sure.

01:30:11 MR. TILTON: Just --

THE COURT: You are not going to tell me about a personal problem as far as vacation is concerned or something like that, are you?

MR. TILTON: Just the week of the 9th, the 16th

01:30:20 would be fine.

THE COURT: You are gone?

MR. TILTON: Yes. I'm scheduled to be very unavailable at that point.

THE COURT: All right. We will go on the 16th in

01:30:30 the morning.

MR. TILTON: All right.

THE COURT: You can make the record that you want to make. And at that point, I'll take argument on your motions. But assuming we can do all of that -- have your witness review all of the records and is available on the 16th, as of right now, that is the only time window I've got. Assuming we can do that, we will accomplish that, we'll take the argument on the record, and dispose of the motions.

01:30:44

01:31:00 MR. TILTON: Thank you, your Honor.

THE COURT: But for now, please count on the trial on the 23rd. And we will pick 14. Each side gets one extra peremptory. The usual time, I think, voir dire and jury instructions are already in, based on the prior trial date, so if you've got any amendments to those, file them as soon as you can.

01:31:25

Okay. Anything else from your standpoint, Mr. Tilton?

MR. TILTON: No, your Honor. Thank you.

01:31:42 THE COURT: Go ahead, Miss Sanford.

MS. SANFORD: Nothing further for the government for today, your Honor.

THE COURT: Very good. Thank you.

See you on the 16th.

01:31:50 COURT CLERK: All rise, please.

Court is in recess.

(At 1:31 p.m., proceedings were concluded.)

C E R T I F I C A T E

I, Kathleen S. Thomas, Official Court Reporter for the United States District Court for the Western District of Michigan, appointed pursuant to the provisions of Title 28, United States Code, Section 753, do hereby certify that the foregoing is a true and correct transcript of proceedings had in the within-entitled and numbered cause on the date hereinbefore set forth; and I do further certify that the foregoing transcript has been prepared by me or under my direction.

/s/

Kathleen S. Thomas, CSR-1300, RPR
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